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Time's Telescope

FOR

1815;

OR,

A Complete Guide to the Almanack:

CONTAINING AN EXPLANATION

OF

SAINTS' DAYS AND HOLIDAYS;

WITH ILLUSTRATIONS OF BRITISH HISTORY AND ANTIQUITIES,

AND

Notices of Obsolete Rites and Customs:

TO WHICH IS ADDED

AN ACCOUNT OF THE

FASTS AND FESTIVALS

Of the Jews.

ASTRONOMICAL OCCURRENCES

IN EVERY MONTH;

COMPRISING REMARKS ON THE PHENOMENA OF THE CELESTIAL BODIES:

A HISTORY OF ASTRONOMY:

AND

THE NATURALIST'S DIARY;

EXPLAINING THE VARIOUS

APPEARANCES IN THE ANIMAL AND VEGETABLE KINGDOMS.

TO WHICH IS PREFIXED

AN ASTRONOMICAL INTRODUCTION.

Illustrated with Cuts.

Second Edition.

To be continued Annually.

London:

PRINTED FOR SHERWOOD, NEELY, AND JONES,

20, Paternoster Row.

1821.

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Advertisement.

A KNOWLEDGE of the works of Nature—like the acquisition of a language—is to be attained only by a regular course of study. We may gaze with rapture on the starry firmament, and admire the varied beauties of the animal and vegetable kingdoms; and yet remain ignorant of the wonderful economy of Nature.

Until the publication of Time's Telescope, *there was no popular and pleasing Annual Guide which exhibited, at one view, the Astronomy and Natural History of the Year, together with an Explanation of Saints' Days and Holidays. The rapid and extensive sale of our last volume has fully proved the necessity of such a work; and the Editor trusts that the Telescope for* 1815 *will be equally worthy of public patronage.*

The present is almost entirely a new work, *and, in addition to much curious information respecting the Fathers of the Church, Popish Legends, Ecclesiastical Regulations, and Saxon and British Customs,—it contains a succinct Account of the* Fasts and Festivals of the Jews,—*and a notice of the Religious Ceremonies at present observed in* Catholic Countries.

The Astronomical Occurrences *will form an agreeable companion to the Observatory, in the absence of more recondite productions, as they include a detail of the various phenomena of the heavenly bodies,* illustrated by Diagrams. *In this part of our work also, will be found a continuation of the View of the Solar System given in the last volume, and a concise* History of

Astronomy; *these, together with the* Astronomical Introduction, *will tend greatly to facilitate the labours of the young student.*

The Naturalist's Diary *for* 1815 *offers a variety of interesting remarks on the Ornithology and Botany of Great Britain; and the poetical sketches, gleaned from the best authors, are, with few exceptions, entirely new.*

Although the present work is complete in itself, yet, as some of our purchasers may not be in possession of the Telescope for 1814, *it may be proper to notice, that, besides the usual features of the work, it contains an Introduction, giving an account of the different Instruments employed for computing Time,—the entire Calendar of Julius Cæsar,—and a description of the French or Republican Calendar. Appended to this volume are some Meteorological Remarks, with observations on the artificial distinctions of clouds,—popular rules for predicting the changes of the weather,—and an account of the Barometer, Thermometer, &c.*

To conclude. In presenting his annual volume to the Public, the Editor begs to assure his friends that no pains will be spared to render every succeeding one still more attractive than its predecessor: nor does he foresee any difficulty in the execution of this pleasing task.—The Astronomical Occurrences will be always new,—*the antiquities, manners, and customs, of our ancestors offer an almost boundless field for description and reflection,—and to supply the* Diary *with fresh stores of instruction and amusement, we need only 'turn over a new leaf' in the exhaustless volume of* NATURE.

LONDON,
November 21st, 1814.

'We cheerfully give to "Time's Telescope" our warmest recommendation as a pleasing and *safe* book for the rising generation.'— *Eclectic Review for February* 1814.

'This Work contains a great variety of very useful information, conveyed in a most pleasing manner. We cannot hesitate to pronounce that it will be popular. It deserves to be so; and it has too many attractions, for every kind of taste, to be overlooked. It will form a delightful as well as instructive present for young persons at Christmas.'—*British Critic for December* 1813.

'This is a valuable compilation.'—*Supplement to Gentleman's Magazine for December* 1813.

'"Time's Telescope" bids fair to acquire considerable popularity. In truth, it deserves to be popular, for the author has shown an equal degree of acquaintance with the general principles of the subject he has undertaken to elucidate, and of taste and judgment in his illustrative and decorative extracts from various descriptive poets and other writers.'—*New Annual Register for* 1813.

'This Work conveys a very considerable portion of intelligence, that may be new to many and useful to all; and it is recommended no less by the neatness of its typographical execution, than the accuracy of its literary and scientific details.'—*Universal Magazine for January* 1814.

'On a general survey of this book, we do not hesitate to pronounce it as one of the most proper to be placed in the hands of young people. It is a little mine of information; and the mind that can rise from its perusal without having gained some important and useful knowledge, must be strongly encased in the leaden armour of stupidity.'—*Commercial Magazine for February* 1814.

I love to rove amidst the *starry* height,
To leave the little scenes of Earth behind,
And let Imagination wing her flight
On eagle pinions swifter than the wind.
I love the *Planets* in their course to trace;
To mark the *Comets* speeding to the SUN,
Then launch into immeasurable space,
Where, lost to human sight, remote they run.
I love to view the MOON, when high she rides
Amidst the heav'ns, in borrowed lustre bright;
To fathom how she rules the subject tides,
And how she borrows from the *Sun* her light.
O! these are wonders of th' ALMIGHTY HAND,
Whose wisdom first the circling orbits planned.

SONNETS, *&c. by* T. RODD.

Introduction.

Principles of Astronomy briefly stated.

Introduction—Dignity and Utility of the Science of Astronomy—Ptolemaic System—Copernican System—System of Tycho Brahè—Classification of Stars—Fixed Stars—Constellations—Milky-way—Nebulæ. Of the Sun and his Motions. Of the Planets. Primary Planets, inferior and superior: Mercury; Venus; the Earth; Ceres; Pallas; Juno; Vesta; Mars; Jupiter; Saturn; Georgium Sidus. Comets. Secondary Planets—The Moon—Tides—Satellites of Jupiter, Saturn, and the Georgium Sidus. The fixed Stars.

ASTRONOMY is that science which treats of the heavenly bodies; and it is by means of this that we learn to investigate the motions of these bodies, the nature and form of their orbits, or paths; the duration of their revolutions, whether real or apparent; their distances from the Sun, from us, and from one another.

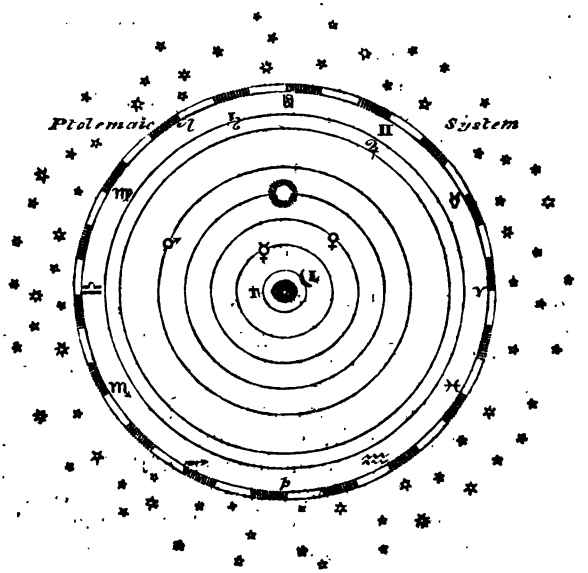
Of the origin and history of this noble science, we have given, in the several parts of this volume, a brief, but accurate, and, we trust, an interesting account. The solar system was pretty fully described in the last volume, to which we would refer our readers, especially young persons, for much important matter on a branch of science, in which all are concerned, and of which no well educated youth, of either sex, can possibly be ignorant. In our subsequent volumes we shall enter more particularly into *descriptive* and *practical* astronomy, of which we know of no popular treatises. As an introduction to the present, we shall briefly state the principles of the science.

Astronomy derives from its nature a certain degree of dignity, and upon it, we should recollect that navigation (so important to the interests of this country), geography, and chronology, chiefly depend. By the aid of astronomy, man is enabled to pass the apparently boundless ocean, to penetrate into foreign cli-

mates, to become better acquainted with those which he inhabits, and regulate the dates of ages past.

The heavens appear to us to be thickly spangled with stars of different magnitudes and degrees of brilliancy: these are called fixed stars and planets. The antients, who knew so little of the motions of the planets, had no means of investigating the true disposition of their orbits, which is the cause of the variety of opinions formerly held on this subject. Some of their philosophers supposed the Earth to be immoveable, as the centre of the universe, and that all the celestial bodies moved round her. Among these was Claudius Ptolemy, the celebrated astronomer and mathematician of Pelusium, in Egypt, who lived in the beginning of the second century of the Christian æra.

Ptolemy, whose name is attached to this system, endeavours to prove that the earth, T, in the annexed figure, is immoveable in the centre of the

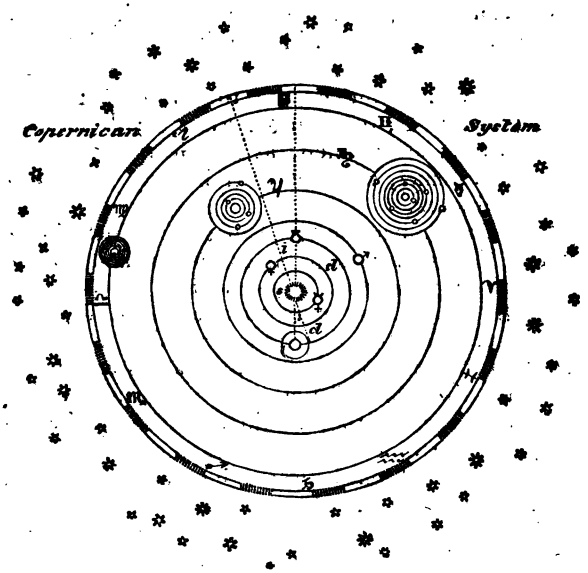


universe, and he placed the Sun and the other planets in orbits that surrounded the orbit of the Earth in the following order, beginning with those which he thought were next the Earth; the Moon ☽; Mercury ☿; Venus ♀; the Sun ☉; Mars ♂; Jupiter ♃; and Saturn ♄: after which, as the Georgium Sidus, or Herschel planet, was not then known, he comes to the fixed stars.

When astronomers observed that the planets Mercury and Venus were sometimes nearer and sometimes farther from the Sun, and that Venus never departs from the Sun more than about 47 degrees, and Mercury about 28 degrees and a half; they soon discovered that the orbits of these planets could not be beyond the orbit of the Earth; because, if that had been the case, they would sometimes have appeared opposite to the Sun, that is, the Earth would sometimes have been between the planets and the Sun, which it never is. Hence the Egyptians thought that these two planets were satellites to the Sun, and turned about him, their orbits being carried with him in his revolution about the Earth. And they supposed the Earth immoveable, as the centre of the system, and that the other celestial bodies revolved about her once in twenty-four hours.

Copernicus, with a view of obviating the inconveniences of the imaginary systems that had preceded him, began by assuming the diurnal motion of the Earth, or her motion round her own axis: this being admitted, he showed the necessity of her annual motion round the Sun in the ecliptic in something more than 365 days. With these two motions, he explained, with the utmost facility, the phenomena of the stations and motions of the planets. According to this theory, the Sun, S*, is the centre of the planetary system, and the several planets, of which the Earth is one, revolve about him in the following

* See the Figure in p. x.



order: Mercury ☿; Venus ♀; the Earth ♁; Mars ♂; Jupiter ♃; and Saturn ♄. Such was the true theory, and the full extent of it, as was then known; since which, as we shall see in our History of Astronomy, towards the close of the volume, another planet, the Georgium Sidus, has been discovered beyond the bounds of Saturn: and four other small planetary bodies are now known to be perpetually revolving about the Sun, in orbits which are situated between the orbits of Mars and Jupiter. In our figure, the small circles about the primary planets are made to represent the orbits of their satellites: thus, our Earth has one, the Moon; Jupiter has four; Saturn has seven; and the Georgium Sidus has six.

Tycho Brahè, who flourished soon after Copernicus, was struck with the fact, that if a stone be

dropped from a high tower, it fell at its foot, and he concluded that the Earth, therefore, was without motion, not considering that the Earth, in this case, is like a vessel in full sail; and if from the top of the loftiest mast a stone be let fall, it will unquestionably be found at the bottom, notwithstanding the velocity of the ship, provided that, during the experiment, its motion be neither accelerated nor retarded.

Tycho Brahé, however, invented a system between that of Ptolemy and Copernicus. He supposed the Earth to be at rest, and *that the other planets revolving about the Sun* turned also with him round the Earth *in 24 hours*. This system, like that of Ptolemy, was too complicated to stand long the test of strict investigation, and it quickly fell to the ground.

There are evidently two kinds of stars, the one very brilliant and twinkling; the others shine with a steady light: the former, or fixed stars, as they are called, shine, no doubt, like the Sun, with their own light, and the others are opake bodies, similar to the Earth which we inhabit, and shine by a borrowed light; that is, by the light which they, in common with us, have from the Sun.

The fixed stars are so denominated, because they are observed always to preserve the same distance from each other: they appear to us to be of different sizes, which may happen from the circumstance of a difference in their real magnitudes, or from a difference in their distances. Perhaps both these causes may operate to produce this effect. Astronomers have agreed in distributing the fixed stars into six classes, according to their apparent magnitudes, calling those of the *first* magnitude which appear the largest, and those of the *sixth* which appear to be the smallest. These however do not include those very small stars which compose the white and brilliant spaces in the heavens which have been denominated nebulæ, and that bright band or zone,

which, from its lucid appearance, is called the milky way.

Those which are distinctly visible are by no means so many as might be expected. To common apprehension they appear innumerable, and it is only by means of a good telescope, and much patient attention, that the observer can separate the real stars from the blaze which deceives the casual spectator. Hence sometimes the stars of the firmament have, with regard to number, been compared with the sand on the sea-shore; whereas, it is well ascertained, that more than a thousand stars can never at one time be seen by the naked eye. The brilliancy of the heavens arises, in a good measure, from those luminaries which are too far distant to admit of distinct vision be the unassisted eye, but which, when traced with the telescopes and gages of a Herschel, are indeed proved to be innumerable: nor is the subject in the least exaggerated by the poet, who says,

> Myriads beyond with blended rays inflame
> The *milky way*, whose stream of vivid light,
> Poured from innumerable fountains round,
> Flows trembling, wave on wave, from sun to sun,
> And whitens the long path to heaven's extreme:
> Distinguished tract! But as with upward flight
> Soaring I gain th' immeasurable steep,
> Contiguous stars, in bright profusion sown
> Thro' these wide fields, all broader into suns,
> Amazing, severed each by gulphs of air
> In circuit ample as the solar heavens.

It has been calculated that the nearest of the fixed stars is at least 32,000,000,000,000 of miles distance from us, which is farther than a cannon-ball would travel, with its first and greatest velocity, in 7,000,000 years.

Though the number of the fixed stars distinctly visible to the naked eye is much less than common observers might imagine, yet it is still too great,

from their resemblance to one another, to enable us to distinguish them by giving each a particular name, as has been done with regard to the planets. Astronomers, therefore, have found a commodious method of arranging them in constellations under the names and figures of various personages, celebrated in antiquity, and even of animals and inanimate bodies, which fable has transported from earth to heaven. Ptolemy enumerated 48 constellations, but upon our celestial globe there are about 70. The stars in each constellation are distinguished by the letters of the Greek alphabet; α, alpha, being annexed to the largest; β, beta, for the next in size, and so on, by which very simple method every star is as easily found and referred to by others as if a distinct name were assigned to it.

The constellations which surround the ecliptic, or apparent annual path of the Sun, that is, the real orbit of the Earth, which is called the zodiac, are the following:

Aries	The Ram	♈	Libra	The Balance	♎
Taurus	Bull	♉	Scorpio	Scorpion	♏
Gemini	Twins	♊	Sagittarius	Archer	♐
Cancer	Crab	♋	Capricornus	Goat	♑
Leo	Lion	♌	Aquarius	Water-bearer	♒
Virgo	Virgin	♍	Pisces	Fishes	♓

These are thus described by the unfortunate Chatterton:

On this earth's orbit mark the various *Signs*,
Mark where the Sun, our year completing, shines:
First the bright *Ram* his languid rays improves,
Next glaring *wat'ry* through the *Bull* he moves;
The am'rous *Twins* admit his genial ray;
Now burning, through the *Crab* he takes his way;
The *Lion* flaming, bears the solar power;
The *Virgin* faints beneath the sultry shower.
Now the just *Balance* weighs his equal force,
The slimy *Serpent* swelters in his course;
The sabled *Archer* clouds his languid face;
The *Goat* with tempests urges on his race;
Now in the *Water* his faint beams appear,
And the cold *Fishes* end the circling year.

The zodiac goes quite round the heavens, and is about sixteen degrees broad, so that it includes the orbits of all the planets and that of the Moon likewise. The ecliptic, which runs through the middle of the zodiac, is divided into twelve equal parts, to each of which parts is given the name of one of the constellations or signs above enumerated. The first of these signs begins always at the point of intersection of the ecliptic with the equator, to which the Sun answers at the vernal equinox.

Besides the twelve constellations in the zodiac, the following 21 enumerated by Ptolemy, in the northern hemisphere, may, by comparing the heavens with a celestial globe, be easily discovered:

Ursa minor	The Little Bear	Auriga	The Waggoner
Ursa major	Great Bear	Serpentarius	
Draco	Dragon	Serpens	Serpent
Cepheus		Sagitta	Arrow
Bootes		Aquila	Eagle
Corona Borealis	Northern Crown	Delphinus	Dolphin
Hercules	Hercules kneeling	Equulus	Horse's Head
Lyra	Harp	Pegasus	Flying Horse
Cygnus	Swan	Andromeda	
Cassiopeia	Lady in her chair	Triangulum	Triangle
Perseus			

The fifteen constellations described by Ptolemy in the southern hemisphere are,

The Whale	The Centaur	The Hydra
Orion	The Hare	The Wolf
Eridanus	The Canis major	The Altar
The Cup	The Canis minor	The Southern Crown
The Crow	The Ship	The Southern Fish

Those stars which could not be comprehended in these forty-eight constellations were called *unformed* stars, but from these the moderns have made several new constellations, which are marked out on the globe: of these, the northern are,

The Camelopard	The Lizard
The Greyhound	The Little Triangle
The Little Lion	Cerberus
The Lynx	The Mountain Menelaus
The Fox and Goose	The Fly

Those added to the southern hemisphere are,

Noah's Dove	The Phœnix
The Unicorn	The Sword-fish
The Cross	The Flying fish
The Sextant	The Water-snake
Sobieski's Shield	The Chameleon
The Royal Oak	The Fly
The Peacock	The Bird of Paradise
The Crane	The South Triangle
The American Goose	The Indian

Notwithstanding these additions, there yet remained in this hemisphere a large space, and a great number of unformed stars, with which the Abbé de la Caille has invented 14 new constellations, viz.

The Carver's Shop	The Air-pump
The Chemical Stove	The Octant
The Clock	The Compass
The Rhomboid Reticule	The Square and Ruler
The Graver	The Telescope
The Painter's Easel	The Microscope
The Mariner's Compass	The Mountain near Table Bay

Besides the *milky way*, to which we have already referred, and the appearance of which is found by the telescope to be owing to a vast number of very small stars that are situated in that part of the heavens, there are several little whitish spots which appear magnified, and more luminous when seen through telescopes, but without any stars being distinguishable in them. One of these is in Andromeda's girdle, which has some whitish rays near the middle, is liable to several changes, and is said occasionally to disappear. There is another near the ecliptic between the head and bow of Sagittarius: it is small, but very luminous. We might also notice the nebulæ, or cloudy stars, but that a more full and interesting account has been given of them in the former volume of the Time's Telescope, p. 291-4, than we have room for here, and to which we invite the attention of the reader.

Of the SUN *and his Motions.*—The Sun with the planets, primary and secondary, and comets, which revolve about and depend upon him for motion, light, and heat, is called the solar system. It is known from observation that those planets which are the nearer to the Sun not only finish their circuits soonest, but likewise move faster in their respective orbits than those which are more remote from him. The motions of all the primary planets, and comets, are performed in elliptical orbits, of which the Sun is in one of the foci; and the secondary planets revolve about their primaries, likewise in elliptical orbits, in one of the foci of which is each primary planet. Thus the Moon revolves about the Earth in an ellipse, the Earth being in one of the foci: the same may be said of Jupiter, Saturn, and the Georgium Sidus, and their Moons.

The Sun, the centre of the system, and the source of light and heat, has two *apparent* motions, the diurnal and annual. By the *former* he appears to move round the Earth once in twenty-four hours: we see, or we think we see, him mount above the horizon in the east, in the morning ascend higher and higher till he reaches the meridian at noon, and then he gradually descends till we lose him under the western horizon: and the uninformed mind, who considers the Earth as a sphere hung in empty space, concludes that during the hours of night the Sun performs a course below the horizon similar to what he has done above it, and by this kind of motion he concludes we have a perpetual change of day and night. By the latter, or apparent annual motion of the Sun, this body appears to traverse that circle in the heavens, which we call the ecliptic, in the course of the year. There is scarcely a casual observer that does not notice the changes of the situation of the Sun in different seasons of the year. Who does not know that the Sun is much higher in the heavens at twelve o'clock, in March or Sep-

tember, than he was at the same hour in December or January, and that he is still much higher in June or July? Who has not noticed that the rising and setting of that luminary were due east and west about the 20th of March and September; and that in proportion as he mounts higher, or not so high, at 12 o'clock, he rises in the morning and sets in the evening more to the north or south of the eastern and western points of the horizon?

These motions are, however, as we have observed, only apparent: the Sun *does not travel* round the Earth *in 24 hours*: he does not change his place in the heavens at different seasons of the year. His apparent motions are occasioned by the Earth's real motions. The Sun's apparent diurnal motion is occasioned by the Earth's real rotation about its axis: and the Sun's apparent annual motion is occasioned by the Earth's real motion in her orbit, through the whole of which she travels in little less than 365 days and 6 hours.

The deception to which our senses are thus liable, with respect to the Sun and stars appearing to move, when it is really the Earth that moves, may be compared to that which we experience when smoothly sailing in a vessel within sight of the shore: the ship seems motionless, and the trees, houses, &c. all appear to be moving in a contrary direction. But one of the most striking deceptions of the kind is mentioned in the second volume of Joyce's *Scientific Dialogues*. If a young or uninformed person, unused to travelling in a post-chaise, suddenly awake from sleep, while the vehicle is in swift motion by the side of a field fresh ploughed in long narrow ridges, and the road be at, or nearly at, right angles to the ridges, he will not, for a few moments, be able to believe that the ridges do not bend round in an opposite direction to that of the motion of the chaise. Some persons who would never hear of the Earth's motion, have, from this circumstance alone,

admitted the possibility of the apparent deception of the senses, and, at length, have become believers in the Copernican system of the world.

Notwithstanding what has been advanced, the vulgar or common language, with respect to astronomy, does not tend to mislead those who are acquainted with the true principles. Thus, though we are assured the Sun does not change its place in the heavens, and it is the Earth that moves, yet it is not unnatural to say, for instance, that the Sun is in Aries, when the Earth is in Libra; because, to an inhabitant of the Earth, the Sun will be seen in that sign: so also when the Earth has advanced 30 degrees in her orbit, we say the Sun has advanced a sign in the heavens, because the real motion of the Earth in her orbit occasions an apparent motion of the Sun, and this luminary will now be seen in a different part of the heavens from what it was a month before.

The Earth's orbit being an ellipse, the Sun is not always at equal distances from it. When it is in his apogee, that is farthest from the Earth, the Sun is full three millions of miles farther from us than when he is in perigee, or nearest the Earth; nevertheless, we feel greater heat when the Sun is in apogee than when he is in perigee; for he is in apogee in our summer season, and in perigee in our winter. The difference of temperature between summer and winter does not depend solely or chiefly upon our nearness to the Sun, but upon the following causes:

1. In summer, the solar rays strike upon the earth more perpendicularly than in winter, and therefore they act with greater force than when they strike it obliquely.

2. The rays of the Sun coming more perpendicularly in summer than in winter, have less of the atmosphere to pass through.

3. In the summer the Sun continues a longer time above the horizon than below it; and consequently

there is time for the Earth to accumulate a greater portion of heat than in the days of winter. We know, in the longest days, that the Sun to us is above the horizon 16 hours; whereas in the shortest it is not more than 8 hours visible.

Astronomers fix on the first point of the sign Aries, as the first point of the zodiac; it is in this and its opposite point, the first in Libra, that the equator of the Earth, supposed to be produced, meets and cuts the ecliptic, which is the apparent path of the Sun. It is from the first point of Aries that the longitude of the fixed stars is reckoned, and when the Sun is in this point we reckon it the vernal equinox. This point, as will be shown hereafter, is found to recede westward every year about 50 seconds of a degree. The fixed stars of course appear to have advanced every year in the same proportion, and their longitude is thus annually augmented. Hence, if the Sun, as seen from the Earth, is in conjunction with any particular star at the moment of the equinox, he will, in the succeeding year, be at the equinox before he arrives at the conjunction with the same star. The arrival, therefore, of the Sun at the equinoctial point *precedes* the termination of his apparent revolution, and from thence is derived the phrase 'the precession of the equinoxes,' of which a full account will be found in pp. 259-263 of the present volume.

The fixed stars appear every twenty-four hours to make an entire revolution about the Earth. The Sun, as we have seen, makes the same apparent circuit, but the apparent diurnal motion of the Sun is apparently slower than that of the fixed stars. This appearance is occasioned by the daily rotation of the Earth on its axis, which is accomplished in something less than 24 hours, but while it is turning once on its axis it advances in its orbit a whole degree, nearly; therefore it must make more than a complete rotation before it can come into the same position with the Sun that it had the preceding day. In the same way, as

when both hands of a watch set off together at any hour, as twelve o'clock, the minute hand must travel more than the whole circle before it overtakes the hour hand; hence the difference between solar and sidereal days, which it is important to understand in explaining the 'Equation of Time:' see Time's Telescope for 1814, p. 41-3, where the subject is fully discussed. To this and other important topics, familiarly illustrated in the present volume, Dr. Darwin alludes:

> Watch, with nice eye, the Earth's diurnal way,
> Marking her solar and sidereal day;
> Her slow nutation, and her varying clime,
> And trace, with mimic art, the march of time.

The Sun, to us, is the most interesting of all the heavenly bodies: the heat which he diffuses animates our world, and his light is the source of all our purest sensible pleasures.

> Fairest of beings! first created light!
> Prime cause of beauty! from thee alone
> The sparkling gem, the vegetable race,
> The nobler worlds that live and breathe, their charms,
> The lovely hues peculiar to each tribe,
> From thy unfailing source of splendour draw!
>
> *Mallet's Excursion.*

The power of the Sun extends to all the planets that revolve about him, but it is the more or less active in proportion as they are nearer to or more distant from him. Though he appears to us merely as a circular disk, yet the Sun is nearly spherical. The deception arises from this; that all the parts of his surface are equally luminous, and consequently there is nothing which can suggest to us, at the distance of 95 millions of miles, that the central parts are more prominent than the sides, although, in reality, they are nearer by half a million of miles. For a similar reason, the full Moon appears to us as a flat surface, but a telescope of high magnifying powers will correct the delusion.

By certain spots in the Sun's disk it is found that he revolves upon its axis in about 25 days, which is two days less than its apparent revolution, in consequence of the Earth's motion in its orbit. From the motion of the spots, which is sometimes straight and sometimes curved, it is discovered that his axis is not perpendicular to the plane of the ecliptic, but inclined to it, so as to make an angle of 7°½ with the perpendicular.

The zodiacal light, as it is called, is another striking phenomenon connected with the Sun. This glorious body is supposed to be enveloped with a fluid matter, which constitutes a kind of atmosphere. This matter is more extended and more abundant round his equator than elsewhere, and gives to the solar atmosphere an appearance somewhat resembling that of a double convex lens, the diameter of which is in the plane of the Sun's equator. It was discovered by Cassini, and it obtained the name of the zodiacal light, because it appears along the zodiac in the form of a cone or pyramid, having its base directed towards the body of the Sun, and its point towards some star in the zodiac. In the spring it appears in the evening, and in autumn in the morning.

Of the PLANETS.—The Planets, like the Earth, are opaque bodies, and nearly spherical. Being opaque in themselves, they become visible only by reflecting the light which they receive from the Sun. The laws by which they are governed were discovered by Kepler, who demonstrated that they must necessarily revolve in elliptical and not in circular orbits.

Astronomers have divided the planets into two classes: in the first are the *primary* planets, viz. Mercury, Venus, the Earth, Mars, Ceres, Pallas, Juno, Vesta, Jupiter, Saturn, and the Georgium Sidus. The second class includes the satellites which

belong to some of the primary planets, such is the Moon, the attendant upon the Earth; such also are the four moons or satellites that revolve about Jupiter; the seven that revolve about Saturn; and the six that wait on the Georgium Sidus.

The *primary* planets revolve about the Sun, and are divided into the *inferior* and *superior*. The *former* are those whose distance from the Sun is less than that of the Earth, and the latter are those whose distance is greater than that of the Earth. Mercury and Venus are inferior planets, or those whose orbits are included within that of the Earth. Mars, Ceres, Pallas, Juno, Vesta, Jupiter, Saturn, and the Georgium Sidus, are superior planets, all whose orbits are beyond the orbit of the Earth.

The planet MERCURY is about 3224 miles in diameter, and revolves around the Sun in 88 days, at the distance of 37 millions of miles. When Mercury is viewed with a telescope of high magnifying power, he exhibits nearly the same phases as the Moon, being sometimes horned, and sometimes full. He is always seen on the same side of the heavens as the Sun; of course, when he is visible in the morning it is in the east, just before Sun-rise, and when seen in an evening it is in the west, soon after the setting Sun. It is not known whether he turns on his axis, though Schroeter suspected he had discovered his period to be 24 days, 5 hours, and 28 minutes. The characteristics of this planet are thus described:

Mercury the first
Near bordering on the day, with speedy wheel
Flies swiftest on, inflaming where he comes
With seven-fold splendour.

The *seven-fold* splendour refers to the quantity of light and heat which he enjoys, compared with the Earth: for the light and heat enjoyed are inversely as

the squares of the mean distances of the planet from the Sun: Mercury being 37 millions of miles from the Sun, and the Earth 95, we say (calling the quantity of light or heat enjoyed by the Earth as 1), as $\overline{95.000.000}^2 : 1 :: \overline{37.000.000}^2$ to a fourth quantity, or, omitting the ciphers, as $\overline{95}^2 : 1 :: \overline{37}^2$; or as $9025 : 1 :: 1369 : \frac{9025}{1369} = 7$ nearly.

Next, VENUS to the westward of the Sun
Full orbed her face, a *golden plain of light*
Circles her *larger* round. Fair morning star!
That *leads* on dawning day to yonder world,
The seat of man.

The diameter of VENUS is not quite so large as that of the Earth, it being 7648 English miles in length, and she performs her revolution about the Sun in 224 days, at the distance of 68 millions of miles. With almost any telescope this planet exhibits the same phases as those of the Moon. Venus enjoys rather more than twice the quantity of light and heat experienced by the Earth. She is an evening star when she appears east of the Sun, and a morning star when she is west of him. By Milton she is described as

Fairest of stars, last in the train of night,
If better thou belong not to the dawn,
Sure pledge of day, that crown'st the smiling morn.

Twice in the course of about 120 years, Venus passes over the disk of the Sun: this phenomenon is called the transit of Venus, and by this, as will be explained in a future volume, astronomers have been enabled to ascertain, with great accuracy, the distance of the Earth from the Sun. Venus is thought to turn on her axis in 23 hours and 20 minutes, and she is said to have an atmosphere fifty miles in height.

Meanwhile distant still our globe terraqueous turns,
Now chills intense, nor fiercely heated burns;
Around her rolls the lunar orb of light,
Trailing her silver glories through the night.

CRAWFURD.

The EARTH, of which the foregoing lines are descriptive, is nearly spherical, as is proved from the voyages made round it by Magellan, Drake, Lord Anson, Cook, and others, who all set out at different times, and, by steering their course continually westward, arrived at length at the places whence they departed, which could never have happened had the Earth been an extended plane.

Its spherical form is also apparent from the circumstances which attend large objects when seen at a distance on the surface of the sea. For when a ship proceeds to sea, we first lose sight of the hull or body of the vessel, afterwards of the rigging, and, at last, can discern only the top of the mast, which must be owing to the convexity of the water between the eye and the object, otherwise the largest and most conspicuous parts would have been visible the longest:

When the glad ship shoots from the port
Upon full sail, the hulk first disappears,
And then the lower, then the higher sails;
At length the summit of the towering mast
Alone is seen. CAPEL LOFFT.

Although the Earth is spherical, it is not an exact sphere, the diameter, from pole to pole, being about 37 miles shorter than that at the equator. It turns on its axis in rather less than 24 hours, and thereby causes the succession of day and night. It has likewise another motion by which its annual journey round the Sun is made in 365 days, 5 hours, 48 minutes, 49 seconds.

The diameter of the Earth, in its course round the Sun, is not perpendicular to its orbit, but inclined to it in an angle of 23°½, and it is owing to this that

the days are of different lengths in different parts of the globe. And the varying seasons of spring, summer, autumn, and winter, depend, 1. On the length of the days and nights; and, 2. Upon the position of the Earth with respect to the Sun, that is, upon the perpendicularity with which the rays of the Sun fall upon any particular part of the Earth.

The Earth's diameter is nearly 8000 miles long, so that any point on its equator is perpetually moving, by the diurnal motion only, at the rate of 1000 miles an hour. Its *motion*, in its annual journey round *the Sun*, is about 65,000 miles in an hour; but the motion of Mercury, in his orbit, is at the rate of 105,000 miles in an hour.

MARS, the first of the superior planets, is distinguishable from the rest by the red and fiery appearance of his disk, which is attributed to the density of his atmosphere:

> Beyond our globe the sanguine Mars displays
> A strong reflection of primeval rays.

His figure, like that of the Earth, is an oblate spheroid. He travels round the Sun in about 687 of our days, at the mean distance of 144 millions of miles from that body; and, therefore, he travels in his orbit at the rate of 53,000 miles in an hour. He has likewise a rotation on his axis in 24 hours 39 minutes, which was discovered by means of an immensely large spot seen on his surface, when he is in that part of his orbit which is opposite to the Sun and Earth.

The planet CERES, when viewed through a good telescope, is of a ruddy colour, and appears to be of the size of a star of the eighth magnitude. It seems to be surrounded with a dense atmosphere. It performs its revolution in 4 years, 7 months, and 10 days, and her mean distance from the Sun is 260

millions of miles. It is observable, that two able astronomers differ very much as to the magnitude of this and the other new planetary bodies. Dr. Herschel says the diameter of Ceres is only 160 miles in length, but Schroeter makes it more than ten times greater, or 1624 miles in length.

The planet PALLAS is nearly of the same magnitude with Ceres: it is distinguishable from Ceres, and all the other primary planets, by the great inclination of his orbit. While these bodies are all revolving about the Sun in almost circular paths, rising only a few degrees above the plane of the ecliptic, Pallas ascends above this plane 35 degrees. Its mean distance from the Sun is 266 millions of miles; and the length of its year a little greater than that of Ceres.

The planet JUNO is of a reddish colour, and is less than either Ceres or Pallas: though discovered the third in order of these small planetary bodies, it is nearer to the Sun than either of them, its mean distance being 250 millions of miles.

The planet VESTA has been seen, in clear weather, by the naked eye. Its light is more intense, pure, and bright, than any of the other three, and it is similar in its appearance to the Georgium Sidus.

Beyond the sphere of Mars, in distant skies
Revolves the mighty magnitude of JOVE,
With kingly state, the rival of the Sun.
About him round four planetary moons,
On Earth with wonder all night long beheld;
Moon above Moon, his fair attendants dance.

Such is Mallet's description of the planet JUPITER, the largest of all the planetary bodies, and, next to Venus, the brightest. When viewed through a good telescope, several belts or bands, darker than the general surface, are observed across the disk parallel to his equator, which, as they are constantly varying,

are supposed to be a series of clouds in his atmosphere. Spots have been occasionally discovered on his disk between the belts; and, from their disappearance and reappearance, his rotation has been estimated at about 9 h. 55 m. 37 s. of our time. This planet is 89,170 miles in diameter, or about 11 times larger than our Earth; of course, as his apparent disk increases according to the square of his diameter, our Earth will, to the inhabitants of Jupiter, appear 121 times less than this noble planet appears to us; for the disk of *Jupiter with* be to that of the Earth as $\overline{11}^2 : \overline{1}^2$ or 121 : 1. The bulks or magnitudes of the two bodies will be to one another as the cubes of their diameters; that is, as $\overline{11}^3 : \overline{1}^3$ or 1231 : 1; that is, Jupiter is more than twelve hundred times larger than the Earth. He performs his annual journey round the Sun, at the distance of 493 millions of miles from that luminary, in something less than 12 of our years.

His form, like that of the Earth and Mars, is that of an oblate spheroid, but, owing to the velocity of his diurnal motion, his equatorial diameter is 6000 miles longer than his polar one. Jupiter, being five times farther distant from the Sun than the Earth, enjoys only a twenty-fifth part as much light and heat as we experience: and, as he moves in his orbit with his axis perpendicular to the plane of that orbit, the inhabitants will experience no change of seasons, nor difference in the length of their days and nights. These will be always nearly five hours each; and at the equator of Jupiter there must be perpetual summer, and at the poles an unceasing winter.

As different opinions have been entertained on the subject of Jupiter's belts, we shall very briefly set down an account of the several theories. By some astronomers they have been regarded as clouds, or as openings in the atmosphere of the planet; while others imagine that they are of a more permanent nature, and are the marks of great physical revolutions,

which are perpetually agitating and changing the surface of the planet. The first of these opinions sufficiently explains the variations in the form and magnitude of the belts, but it by no means accounts for the permanence of some of the spots, and the parallelism of the belts of Jupiter. The spot first observed by Cassini, which reappeared eight times between the years 1665 and 1708, could not possibly be occasioned by any atmospherical variations; and its disappearance for five years, between 1708 and 1713, is a presumptive, though not a decisive, argument, that it arose from some changes in the body of the planet. We are, however, rather disposed to think, that, from the frequent appearance of this spot, it is permanent upon the body of Jupiter, and that its disappearance is owing to the interposition of clouds in the atmosphere of the planet. If it were the effect of an earthquake or inundation, and if it were the mark of a new island or continent, as has been conjectured, upon what principle can we account for its reappearance in 1713, in precisely the same form and position? May we not, then, suppose that the clouds of Jupiter, partaking of the great velocity of his diurnal motion, are formed into strata parallel with the equator; that the body of Jupiter reflects less light than the clouds; and that the belts are nothing more than the body of the planet seen through the parallel interstices which lie between the different strata of clouds? The permanent spot seen by Cassini will, of course, only be seen when it is immediately below one of these interstices, and will therefore always appear as if it accompanied one of the belts. It has always been seen in connection with the great southern belt of Jupiter. The belt indeed has been observed without the spot, but this was probably owing to a variation in the distance of the belt from the equator of Jupiter.

The planet SATURN is more than 79,000 miles in

diameter, and is distinguished, when observed by the naked eye, by its pale dead light, very unlike that of Jupiter and the other planets: from these also he is distinguished by a large luminous ring, surrounding his body, which was discovered by the celebrated Huygens: he is compared, as to his distance from the centre and other properties, by Chatterton,

> But farther yet the tardy Saturn lags,
> And *seven* attendant luminaries drags;
> Investing with a double ring his pace,
> He circles thro' immensity of space.

His distance from the Sun being so great, his motion in his orbit is proportionally slow; and his journey being so much longer likewise than that of the other planets, he takes almost 30 of our years to accomplish one of his; nevertheless he travels at the rate of more than 20,000 miles in an hour, and yet the poet, comparing his motion with that of the other planets, calls it a tardy and lagging motion. His distance from the Sun being between 9 and 10 times greater than that of the Earth, he will enjoy only about the ninetieth part of the light and heat experienced by us; the light, however, which is spread upon this remote planet, is computed to be equal to that which 500 of our full Moons would exhibit to us, and therefore it is only by comparison that our accomplished poetess, Mrs. Barbauld, speaks of his situation as

> ——— the dim verge, the suburbs of the system,
> Where cheerless Saturn, midst his wat'ry moons,
> Girt with a lucid zone, majestic sits.

When Saturn is examined by a good telescope, he appears to be of a spheroidal form, which arises from the rapid rotation of the planet upon his axis, which Dr. Herschel has found to be performed in little more than ten hours. The surface of Saturn is diversified, lik that of some of the other planets, with dark spots and belts. Huygens observed five belts which were

nearly parallel to the equator. They were noticed likewise by Cassini and Messier. Dr. Herschel has likewise observed several belts which in general are parallel with the ring. On the 11th of November, 1793, he noticed a bright, uniform, and broad belt, and close to it a broad and darker belt, divided by two narrow white streaks; so that he evidently saw five belts, three of which were dark and two bright. These belts cover a larger zone of the disk of Saturn than the belts of Jupiter occupy upon his surface.

The ring of Saturn, which makes a most beautiful appearance through a telescope, consists of two concentric rings, detached from each other, and from the body of the planet, the innermost of which is nearly thrice as broad as the outermost. The dimensions of this magnificent zone, as determined by Dr. Herschel, will be found at p. 298, vol. i, Time's Telescope.

The ring of Saturn casts a deep shadow upon the planet: it is sharply defined both in its inner and outer edge, and appears to be more luminous than Saturn himself. Hence it has been inferred that it is not a shining fluid or aurora borealis, but a solid body equal in density to the planet. To this ring the poet refers, when, after speaking of the dreariness of the remote situation of the planet, and of the intensity of its cold, he says,

> ——— yet even here the sight,
> Amid these doleful scenes, new matter finds
> Of wonder and delight! a mighty ring,
> On each side rising from th' horizon's verge,
> Self-poised in air, with its bright circle round
> Encompasseth his orb. MALLET.

It has been completely ascertained, that the flattening at the poles of the Earth, Jupiter, Mars, and Saturn, arises from the centrifugal force of their equatorial parts. On account of the great diameter of Jupiter, and the rapidity of his daily motion, his equatorial parts move with immense velocity; and, there-

fore, in consequence of their great centrifugal force, this planet is more flattened at his poles than either the Earth or Mars. It is remarkable, however, that Saturn should be more flattened at his poles than Jupiter, though the velocity of the equatorial parts of the former is much less than that of the latter. When we consider, however, that the ring of Saturn lies in the plane of his equator, and that it is equally if not more dense than the planet, we shall find no difficulty in accounting for the great accumulation of matter at the equator of Saturn. The ring acts more powerfully upon the equatorial regions of Saturn than upon any part of his disk; and by diminishing the gravity of these parts, it aids the centrifugal force in flattening the poles of the planet. Had Saturn, indeed, never revolved upon its axis, the action of the ring would, of itself, have been sufficient to give him the form of an oblate spheroid.

The planet Saturn is surrounded with no fewer than seven satellites, which supply him with light during the absence of the Sun; but of these we shall speak hereafter.

The GEORGIUM SIDUS, called also the Herschel planet, is, as far as has been discovered, the outermost body of our system: an account of its discovery by Dr. Herschel will be found in the History of Astronomy, p. 309, 310, of the present volume. It is too far distant from the Earth to admit of very accurate observation, though it has sometimes been seen by the naked eye. The lines which Mallet applied to Saturn are now, with a little change, more applicable to the Georgium Sidus or Herschel planet:

Last, outmost Herschel walks his frontier round,
The boundary of worlds; with his pale moons,
Faint-glimmering thro' the darkness night has thrown,
Deep dy'd and dead, o'er this chill globe forlorn:
An endless desart, where extreme of Cold
Eternal sits, as in his native seat,
On wintry hills of never-thawing ice;
Such Herschel's earth.

This new planet is denominated by foreign astronomers the Uranus, as well as the Herschel. Though discovered by Dr. Herschel, as a planet, it had been observed by Flamstead, Mayer, and others, and put down in their catalogues of fixed stars. It is situated at the distance of 1,800,000 miles from the Sun, and performs its annual journey round that luminary in little more than 83 of our years. Its diameter is 35,112 miles, or about 4½ times larger than that of the Earth; of course the disk of our planet being 20 times less to the inhabitants of the Herschel than he is to us, it must be wholly invisible to them without the aid of very powerful glasses. How mortifying to the pride of man, that the planet upon which he lives is so insignificant as not even to be known to exist by other inhabitants of the system of which it is a part!

When seen by the naked eye, it appears like a fixed star of the sixth magnitude, with a blueish white light, and a brilliancy between that of Venus and the Moon.

Besides the primary planets there are other bodies attached to our system, which, although their orbits are singularly eccentric, have many things in common with those bodies which we have just described: these are named comets. They are not luminous of themselves, but, like the planets, are opake, shining only by the light of the Sun. Comets revolve about the Sun in a manner peculiar to themselves, that is, in elliptical orbits, which are very long and eccentric; but their motion is evidently regulated by laws similar to those by which the annual motions of the planets are governed. This being ascertained, astronomers have attempted to calculate the period of their return, and in one case, at least, with apparently complete success, since it is generally agreed that the comet which appeared in 1759 was the same which was observed in 1531, 1607, and 1682. This being admitted, its periodical revolution being about 76 years, it accordingly may be expected again in 1835.

Some of the comets move from west to east, like the planets, but others have unquestionably proceeded in a contrary direction from east to west, and in the contrary order of the signs. Some of them pass nearly in the line of the ecliptic or orbit of the Earth, and some almost perpendicular to it. Their orbits being extremely protracted and eccentrical, the aphelion of a comet, or the point in which it is at its greatest distance from the Sun, is so great, that the light they receive from him is much too feeble to be reflected to us, and they *only become* visible when they approach *to their* perihelion. The time, therefore, of their being visible to the inhabitants of this globe is very short, compared with the period of their disappearance.

In the ages of ignorance and superstition, comets were regarded as the infallible harbingers of great and awful political convulsions: wars, pestilence, and famine, were among the dreadful evils which they were supposed to foretel, and to this circumstance many of our modern poets have alluded in descriptive and strong language:

> Hast thou ne'er seen the comet's flaming flight?
> Th' illustrious stranger passing, terror sheds
> On gazing nations, from his fiery train
> Of length enormous; takes his ample round
> Through depths of ether; coasts unnumbered worlds
> Of more than solar glory; doubles wide
> Heaven's mighty cape, and then revisits Earth,
> From the long travel of a thousand years.
>
> YOUNG.

The language of Milton is still stronger when he compares his hero to a comet:

> Incensed with indignation, Satan stood
> Unterrified, and like a comet burned
> That fires the length of Ophiucus huge
> In the arctic sky, and from his horrid hair
> Shakes pestilence and war.

Similar ideas are finely drawn by Savage:

> In fancy's eye encount'ring armies glare,
> And sanguine ensigns wave unfurled in air!
> Hence the deep vulgar deem impending fate,
> A monarch ruined, or unpeopled state.
> Thus comets, dreadful visitants! arise,
> To *them* wild omens, science to the *wise*.
> These mark the comet to the Sun incline,
> While deep-red flames around its centre shine!
> While its fierce rear a winding trail displays,
> And lights all ether with the sweeping blaze!
> Or when, compelled, it flies the torrid zone,
> And shoots by worlds unnumbered and unknown;
> By worlds, whose people, all aghast with fear,
> May view that minister of vengeance near!

The poet, in describing the knowledge of comets, as 'science to the wise,' seems to have anticipated the expectations of some of our contemporaries. After all that has been done and written on the subject of comets, says a late writer, we must confess, that our knowledge of these wandering bodies is still very imperfect. But we hope the unequalled vigilance and skill of modern astronomers will remove the obstacles which lie in this department of science. 'It appears to me,' says the celebrated Lalande, 'that almost every thing depends on comets. The only thing that I recommend to my correspondents, is to look after and attend to comets: the knowledge of comets is alone wanting to complete the science of astronomy.'

Notwithstanding the superstitious notions which the antients in general attached to the appearance of comets, there were some who conjectured that they were a distinct species of celestial bodies. In the antient Italian and Pythagorean schools, there were those who regarded them as partaking of the nature of planets, and that they had their periodical times of appearing; that they were out of sight a long time, while they were carried aloft at an immense distance

from the earth, but became visible when they approached the terrestrial globe. The reader will find much interesting matter on the subject of comets in the last volume of the Time's Telescope, p. 325-31. To which, and to the foregoing observations, we subjoin the following remark: "It is by no means impossible, nor quite improbable, that, in the course of many ages, a comet may actually meet one of the planets. The effect of such a concourse must be dreadful; a change of the axis of diurnal rotation must result from it, and the sea must desert its former bed, and overflow the new equatorial regions. The shock and the deluge must destroy all the works of man, and most of the race. The remainder, reduced to misery, must long struggle for existence, and all remembrance of former arts and events must be lost, and every thing must be invented anew. There are not wanting traces of such devastations in this globe: strata and things are now found on mountain tops, which were certainly at the bottom of the ocean in former times; remains of tropical animals and plants are now dug up in the circumpolar regions. *Tempora mutantur, et nos mutamur in illis.* It must be observed, though, that comets pass so rapidly, when near us, that the effect of their attraction is not to be feared. It is only by actually striking the Earth, that they could produce the dreadful effect: but the shock, though possible, is very improbable in the course of a man's life; it would require so extraordinary a chance for the concurrence of two bodies so small, with respect to the immensity of the space in which they move, that no reasonable ground of fear can be maintained on this account."

The *secondary* planets are those which perform their revolution round other planets, while they themselves are making their revolutions about the Sun. There are eighteen of these, viz. our Moon, the four satellites of Jupiter, the seven that attend upon

Saturn, and the six which belong to the Georgium Sidus.

Of the Moon.—Of all the celestial bodies, the Moon, next to the Sun, has the most beneficial influence upon our globe. In pp. 93-97 of this volume will be found an account of her various phases, or changes to which, in the course of her journey, she is continually subject. Her beautiful appearance in the skies, with her regular variations, cannot fail to attract the notice of the most inattentive and unobservant spectator; and the advantages which she bestows on man, might, one should think, excite general sentiments of gratitude to that Being, by whose command

> ——————— the Moon, as daylight fades,
> Lifts her broad circle in the deep'ning shades;
> Arrayed in glory, and enthroned in light,
> And breaks the solemn terrors of the night:
> Sweetly inconstant in her varying flame,
> She changes still, another, yet the same!

By the naked eye, we can discover many of the most remarkable phenomena that distinguish the Moon from the other celestial bodies about her. She is a secondary planet, constantly attending upon the Earth, and revolving about her, from change to change, in 29 days, 12 hours, and 44 minutes, and accompanying her in her circuit round the Sun in a year. Her diameter is 2180 miles, and her distance from the centre of the Earth is 240,000 miles. She goes round her own orbit in 27 days, 7 hours, and 43 minutes, moving at the rate of 2290 miles in an hour; and she turns round her axis exactly in the same time that she takes in revolving about the Earth; so that she always keeps the same side towards the Earth; and the length of her day and night, taken together, is exactly equal to our lunar month.

The Moon, like the Earth, is globular and opaque, shining only by reflecting the Sun's light; while

that half of her, therefore, which is toward the Sun, is illuminated, the other half is dark and invisible. Hence, as will be clearly shown in another part of the present volume, she disappears when she comes between the Earth and Sun.

The Moon has no visible atmosphere; for if she had, we could never see her edge so well defined as it appears; but there would be a sort of mist or haziness about her which would make the stars look fainter when they are seen through it. But it has been clearly ascertained, that the stars which disappear behind the Moon, retain their full lustre, until they seem to touch her very edge, when they vanish in a moment. No seas have been discovered in the Moon, otherwise there would be vapours and clouds, but these could not be sustained without an atmosphere. Moreover, when the Moon is above our horizon, in the night, she is always visible, and constantly clear and serene, unless hidden from our view by the clouds in our own atmosphere. Those dark parts of the Moon which were formerly thought to be seas, are now, with more probability, conjectured to be only vast and deep cavities which do not reflect the Sun's rays so strongly as the other parts.

Such are the principal phenomena that distinguish this beautiful luminary; and if we advert to the benefits of which she is productive to our globe, we can scarcely be wanting in emotions of gratitude to the Creator, who, in this, as in all his works, has displayed infinite wisdom and inexhaustible goodness. 'How cheerless and uncomfortable,' says a good writer, 'would be our nights, but for the constant returns of light, which this our sister orb, our faithful and inseparable companion, dispenses in such agreeable vicissitude! How highly useful are even her eclipses,* in our astronomical, geographical, and chronological calculations! How salutary, too, is

* The doctrine of eclipses is explained in page 179 et seq. of this volume.

her attractive influence, which sways the ocean, and actuates the world of waters; which swells the tides, and perpetuates the regular returns of ebb and flow, and which thus not only preserves the liquid element itself from putrefaction, but the surrounding continents, in course, from infection and disease!'

Of the HARVEST MOON.—As the Moon moves from west to east about 13 degrees every day, she rises, generally, about 50 minutes later every evening. In the autumnal season, however, the full Moon seems to rise, for several nights successively, at or near the time of sun-set, and is then called the harvest-moon. If the Moon moved in the plane of the equator, she would rise exactly 50 minutes later every night, as the equator makes equal angles with the horizon at all times of the day, and at every season of the year. But as the Moon revolves in an orbit considerably inclined to the equator, and nearly in the plane of the ecliptic, this orbit makes different angles with the horizon, as may be seen in a common globe. If the Moon is in that part of her orbit which makes the greatest angle with the horizon, a smaller portion of her orbit will ascend above the horizon during a given time, than when she is in that part of her orbit which makes the least angle with the horizon. When the Moon is in the 23d degree of Leo, 13 degrees of her orbit, which she describes in a day, rise above the horizon in the space of 1 h. 17 m.; and, therefore, at that time the Moon rises 1 h. 17 m. later on the following evening; but when the Moon is in the beginning of Aries, her orbit is so oblique to the horizon, that 13 degrees of it rise in the short space of 17 minutes; so that at that time the Moon appears to rise, for several successive nights, at nearly the same hour. Now, the Moon is in the beginning of Aries once every month; and therefore she should appear to rise every month nearly at the same time for several nights. This is undoubtedly the case; but as the

Moon is not full when this takes place, except in the harvest months, the phenomenon passes unobserved. Since the Moon is always opposite to the Sun when she is full, and since it is only when she is in Pisces and Aries that the harvest Moon can happen, the harvest Moon can only take place when the Sun is in the opposite signs, Virgo and Libra, that is in the autumnal months. Hence there can be only two full Moons in the year which rise, for almost a week together, about the setting of the Sun. The first of these Moons is called *the Harvest*, and the second the *Hunter's Moon*.

Since the Moon does not move in the ecliptic, but in an orbit inclined to the plane of the ecliptic, having one half of it above and one half of it below that plane, it is obvious that the part of the Moon's orbit at the ascending node, when the Moon rises above the ecliptic, must make a less angle with the horizon than the ecliptic itself; and, on the contrary, that the part of the Moon's orbit at the descending node, where the Moon descends below the ecliptic, must make a greater angle with the horizon than the ecliptic itself. When the ascending node is in Aries, the Moon's orbit makes an angle of $5\frac{1}{2}$ degrees less with the horizon than the ecliptic does, and therefore a greater proportion of the ecliptic will rise above the horizon, while the Moon describes 13 degrees of her orbit; consequently the harvest Moon will rise more nearly at the same time than if the Moon had been in the ecliptic: these harvest Moons are said to be most beneficial to the husbandman. In the course of 9 years and 112 days, when the Moon's nodes have performed half a revolution, and when the descending node has come to Aries, the Moon's orbit will make an angle with the horizon $5\frac{1}{2}$ degrees greater than when she is in the ecliptic; and, consequently, the harvest Moon will not rise so nearly at the same time as if the Moon had been in the ecliptic: these Moons are said to be the least beneficial. The

harvest Moons will be least beneficial in 1831, 1849; and most beneficial in 1820, 1839, 1857.

The different phenomena of the harvest Moon may be easily illustrated upon a common globe, by drawing upon it, with a pencil, the Moon's orbit inclined 5½ degrees to the ecliptic.

Of the TIDES.—The tides, with which every one is acquainted, depend very much, though not entirely, upon the influence and action of the Moon. We shall, therefore, endeavour to explain in what way they are produced, and how they are to be accounted for.

The principle of universal gravitation, to which in this and the preceding volume we have frequently referred, and by which all bodies attract one another with forces proportioned to the quantities of matter contained in them, is that on which the ebbing and flowing of the seas, called tides, depend. In virtue of this universal principle, the Moon attracts the waters of the Earth, and raises them on the side next to the Moon; and as this attraction is greater or less, according to the distances at which the bodies are separated from one another, it will have scarcely any power upon the waters on the opposite side of the Earth; of course they will be raised by flying away from the centre, so that there will be two tides, at the same time, on opposite sides of the Earth, the one occasioned by the direct attraction of the Moon, and the other by the receding of the waters from the centre, as being less attracted than all the other parts, by their great distance from the attracting body. It is evident, also, that if the waters in the opposite parts of the Earth are thus raised above their natural level, there must be other parts where the waters will be lower than their natural level; the elevation in some parts must occasion a depression in others. As the Earth performs its diurnal revolution in 24 hours, there will be an elevation of water, at any given place,

once in that time, by the direct attraction of the Moon; in like manner, the same principle operating upon every part of the waters once in 24 hours, there will be a tide in every place once in that time, by the direct attraction of the Moon; and once also by the want of attraction, as we have explained. For the same reason there must be low water twice in 24 hours in every place. The various phenomena of the tides, however, depend chiefly upon the position of the Earth's axis with regard to the Moon, as may be more fully explained in another *volume*.

When the *Moon* has no declination, or is exactly in the equator, the rotation of the Earth round its axis will make the two tides exactly equal on every part of the earth. The tides are, in this case, the greatest in and about the equator, and they diminish gradually towards the poles. When the Moon is north of the equator, at her greatest north declination, the places north of the equator will have the highest tides when the Moon is above the horizon, and the lowest when she is below it, and *vice versa*.

Hence it should appear that the tides ought to be highest under the Moon, or when the Moon is on the meridian of the place, or on the opposite meridian. This, however, is not exactly the case, for it is found, from observation, that the highest tide happens about two hours after the southing of the Moon, that is after it has been on the meridian. This arises from the impulse that has been communicated to the waters when the Moon reaches the meridian, which continues to act after the cause that produced it has begun to diminish, in the same manner as the hottest time of the day is not at 12 o'clock, but, in the summer, about 2 or 3 o'clock; and the hottest season is not in June, when the days are longest, but in the middle or end of July.

The tides are not produced solely by the action of the Moon. The Sun has a considerable influence upon the sea; but his distance is so great, that he pro-

duces only about ⅓ of the effect of the Moon. When the Sun and Moon are in conjunction, or in opposition, and thus exert their combined influence in raising the sea, in the same direction, the tide is highest, and it is called a *spring tide*. When the Moon is in quadrature with regard to the Sun, the action of one of these bodies diminishes the effect produced by the other.

When the Moon is in her perigee, that is, nearest the Earth, the tides will be greater than when she is in any other part of her orbit; and, in like manner, the tides produced by the Sun will be greatest in winter, when he is nearest the Earth. If the Moon, therefore, should be in perigee, when she is in conjunction or opposition, and when the Sun is nearest the Earth, the tides will be extremely high. It appears, however, from observation, that the tides are highest at the time of the equinoxes, or, rather, a little after the autumnal equinox, and a little before the vernal equinox. When the Moon, therefore, is in perigee, at the time of her conjunction or opposition, in February and March, or in September and October, the tides may be expected to be the highest. Since, then, the tides chiefly depend upon the Moon, and since it is high water at a certain time after the Moon comes to the meridian, it must be high water 50 minutes later every day, as the Moon is, on the average, about 50 minutes later every day in coming to the meridian, on account of her motion in her orbit from west to east.

Of the SATELLITES *of* JUPITER.—The four satellites of Jupiter, which were discovered by Galileo, may frequently be well seen with a telescope that magnifies 30 or 40 times. The third and fourth have occasionally been seen with the naked eye. These bodies, small indeed, compared with their primary, but, no doubt, large enough to produce important effects on him and for his advantage, have been observed by

astronomers with great assiduity during the last century, and the tables of their motions have been brought to a degree of perfection, which the most sanguine expectations could never have anticipated; and they have been rendered essentially useful, in enabling geographers to determine, with accuracy, the longitude of places on the surface of the Earth.

In looking at the satellites of Jupiter through a common teleseope, they appear to be of different magnitudes; but their diameters are so extremely small, that no means have yet been devised to obtain an accurate measure of them, even by the application of the micrometer. The eclipses of these bodies have, however, furnished a method of estimating their magnitude, for the larger the body, the longer will it take in entering into the shadow caused by the planet. In this way M. Bailly and La Place have determined the diameters of Jupiter's satellites. By thus comparing the shadows of the satellites when seen upon the disk of Jupiter, is has been found that the third and fourth were five or six times larger than the first, and the first twice as large as the second; but by Dr. Herschel it has been found that the third satellite is considerably larger than the rest; the first is somewhat larger than the second, and nearly the size of the fourth; and the second is a little smaller than the first and fourth, or the smallest of the four.

Astronomers, particularly La Place, have demonstrated certain theorems relating to the planet Jupiter and his satellites, from which it appears, that a wonderful provision is made in the system to secure to the planet the benefit of his satellites. When Jupiter is deprived, at the same instant, of the light of the first and second satellites, or of the first and third, the remaining one of the three first cannot possibly be eclipsed at the same time, but is in such a point of its orbit as to give considerable light to the planet.

By means of the eclipses of Jupiter's satellites, a

method has been obtained for demonstrating that the motion of light is progressive, and not instantaneous, as was formerly supposed: it is found to travel from the Sun to the Earth, that is 95 millions of miles, in about 8 minutes. This discovery, so important to the interests of science, is alluded to in the Excursion of Mallet: speaking of the satellites, it is said,

> By these observed the rapid progress finds
> Of Light itself; how swift the headlong ray
> Shoots from the Sun's height thro' unbounded space,
> At once enlight'ning air, and earth, and heaven.

Of the SATELLITES *of* SATURN.—Of these there are seven, but, being at so great a distance from the Earth, they cannot be seen but by means of an excellent telescope. The sixth and seventh are the smallest of the whole; the first and second are the next smallest; the third is larger than the first and second; and the fourth is the largest of them all. It is a curious fact, that the fifth satellite surpasses all of them, except the fourth, in brightness, when it is at its western elongation from Saturn; but at other times it is extremely small, and entirely disappears at its eastern elongation. This phenomenon is thought to arise from one part of the satellite being composed of matter less capable of reflecting the light than the rest. In consequence of the rotation of the satellite on its axis, this obscure part of its disk is turned, like the Earth's, when it is in the part of its orbit east of Saturn; and the luminous part of its surface becomes visible while it enters into the western part of its orbit. Dr. Herschel discovered that this satellite, like our Moon, and the satellites of Jupiter, turned round its axis in the same time that it performed its revolution round the primary planet.

Of the SATELLITES *of the* GEORGIUM SIDUS.—There are six of these, of which little is known; but this very remarkable fact has been ascertained, viz. that

they all move in a *retrograde* direction, and in orbits lying in the same plane, and almost perpendicular to the ecliptic. Dr. Herschel assumes, that the eclipses of these will, in the year 1818, be visible to those who possess telescopes of high magnifying powers, when they will appear to ascend through the shadow of the planet in a direction almost perpendicular to the ecliptic. La Place says, the first five of the satellites of the Georgium Sidus may be retained in their orbits by the action of its equator, and the sixth by the action of the interior satellites; and thence he concludes, that this planet *revolves* about an axis but little *inclined* to the ecliptic, and that the time of its diurnal rotation cannot be much less than that of Jupiter and Saturn.

Of the FIXED STARS.—All the heavenly bodies beyond our system are called fixed stars: they do not appear, with a few exceptions, to have any proper motion of their own. From their immense distance, they must be bodies of very great magnitude, otherwise they could not be visible. They are easily known from the planets by their twinkling. Dr. Herschel, by means of his improved telescopes, has discovered that the number of fixed stars is great beyond all conception. They are probably suns to other systems.

> Unknown suns to unknown systems rise,
> Whose numbers who shall tell? stupendous host!
> In flaming millions through the vacant hung
> Sun beyond Sun, and world to world unseen,
> Measureless distance, unconceived by thought!
> Awful their order; each the central fire
> Of his surrounding stars, whose whirling speed,
> Solemn and silent, through the pathless void,
> Nor change nor error knows.

From an attentive examination of the stars with good telescopes, many that appear only single to the naked eye, are found to consist of two, three, or more stars. The late Dr. Maskelyne observed the α *Her-*

culis to be a double star, and other astronomers have discovered many more to be double. Dr. Herschel has found 700; of these about 40 had been observed before. The following will serve as a specimen, and afford the observer a few objects for his attention.

α, Herculis, is a beautiful double star: the two bodies are apparently unequal: the largest is red, and the smallest of a blueish colour inclining to green.

γ, Andromedæ, double, very unequal; the larger of a reddish white colour; the smaller a fine bright sky blue, inclining to green.

β, Lyræ, quadruple, unequal white, but three out of the four inclined to red.

ε, Bootis, double, very unequal, larger, of a reddish colour; the smaller is blue, or of a faint lilac colour.

α, Lyræ, double, very unequal; the larger is a fine brilliant white, the smaller dusky.

Several stars mentioned by the antient astronomers are not now to be found; and several that are now observed do not appear in their catalogues: but on the subject of fixed stars we refer to T. T. for 1814, p. 291, &c. and we shall renew the subject in the next volume. In the mean time, we may observe that philosophy, from the most common appearance in nature, viz. the fall of heavy bodies to the Earth, rises by patient consideration to the great law of gravitation; and having established the general principle, she extends it over the universe, explaining, as we have seen, not only the phenomena of this Earth, but the revolutions of the whole planetary system. What a glorious harvest of science is thus opened to our view!

——— Seized in thought,
On fancy's wild and roving wing I sail,
From the green borders of the peopled earth,
And the pale Moon, her duteous fair attendant;

From solitary Mars; from the vast orb
Of Jupiter, whose huge gigantic bulk
Dances in ether, like the lightest leaf
To the dim verge, the suburbs of the system,
Where cheerless Saturn, 'midst his wat'ry Moons,
Girt with a lucid zone, majestic sits
In gloomy grandeur; like an exiled queen
Amongst her weeping handmaids: fearless thence
I launch into the trackless deeps of space,
Where, burning round, ten thousand Suns appear
Of elder beam, which ask no leave to shine
Of our terrestrial star, nor borrow light
From the proud regent of our scanty day;
Sons of the morning, *first born of creation*,
And only *less than* HIM who marks their track,
And guides their fiery wheels.

BARBAULD.

Moments makes minutes, minutes form the hour,
And circling hours the day and night compose;
Days form the week, and months the weeks devour,
And to the months the years its fulness owes.
Yet moments, minutes, hours we throw away,
And heed not TIME, that wings his rapid flight;
In folly we consume the flitting day,
In lengthened slumbers waste returning night:
And weeks flow on, and months, and seasons too,
And years are lost as if too light to prize;
And as we older grow, alas! how few
Grow with our years more diligently wise!
And yet that life is short we all complain,
With days, weeks, months, and years, all spent in vain.

SONNETS, &c. *by* T. RODD.

TIME'S TELESCOPE

FOR

1815.

JANUARY.

THE name given to this month by the Romans was taken from *Janus*, one of their divinities, to whom they gave two faces; because on the one side, the first day of this month looked towards the new year, and on the other towards the old one. It was called *wolf-monat* by our Saxon ancestors, on account of the danger then experienced from wolves, 'for that through the extremity of cold and snow, those ravenous creatures could not find of other beasts sufficient to feed upon.'

Remarkable Days.

1.—CIRCUMCISION.

THIS festival was instituted in the sixth century. At the commencement of the new year we rejoice with our friends, at having escaped the dangers that attend every season, and commemorate the event by some trifling present.

The Romans, at this time, sent presents of sweetmeats, as dried figs, honey, &c. (*strenæ*), expressing a wish, that their friends might enjoy the *sweets* of the year, into which they had entered. The *Calends* of January, or the beginning of the year, were celebrated in the most gross and licentious manner. To

this St. Augustin alludes, in his address to some convert from Paganism. '*Will you celebrate the* Strenæ *as the Pagans do, and spend that day in gaming and drunkenness? What a contradiction is here between your profession and practice! While they send their presents, do you give alms: while they attend to lascivious songs, let your application be to the sacred oracles. While they run to the theatre, hasten to church. While they get drunk, do you fast; or, if you cannot fast, at least eat with temperance and sobriety.*' A relic of this custom is still observed in the south of Scotland, where the *sweetie-skon*, a sort of plum-cake, constitutes the New Year's Gift. Among the *northern nations*, it was customary for subjects to present gifts to their sovereigns, which were called *jolagiafir*, yule-gifts.

In France, particularly in the south, early in the morning of New Year's Day, a round of visits is commenced to relations and friends, to wish them a happy new year, and to present them with *bonbons* (sweet-meats). 'The relations are first visited, beginning with those nearest in affinity, then those that are further removed, and lastly come the friends and acquaintance. It is a contest of politeness on this occasion which shall start first, and anticipate the call of a relation or friend.

'The shops of the confectioners are dressed up on the day before with looking-glasses, intermixed with festoons of silk or muslin, and branches of ribands or flowers. The counters are covered over with a nice table-cloth, and set out with cakes, sweetmeats, dried fruits, and bonbons, made up into pyramids, castles, columns, or any form which the taste of the decorator may suggest; and in the evening they are illuminated for the reception of company, who come to buy their bonbons for the next day. Endless are the devices for things in which they are to be inclosed; there are little boxes or baskets made of satin, ornamented with gold, silver, or foil; bal-

loons,—books,—fruit, such as apples, pears, oranges, —or vegetables, such as a cauliflower, a root of celery, an onion; any thing, in short, which can be made with a hollow within to hold the bonbons: but the most prevailing device is what is called a *cornet*, that is, a little cone ornamented in different ways with a bag to draw over the large end and close it up. In these things, the prices of which vary from one franc (ten pence) to fifty, the bonbons are presented by those who choose to be at the expense of them, and by those who do not they are only wrapped in a piece of paper; but bonbons in some way or other must be presented. In these visits to friends, and in gossiping at the confectioners' shops, which are the great lounge for the occasion, the morning of New-year's day is passed; a dinner is given by some member of the family to all the rest, and the evening concludes, like Christmas day, with cards, dancing, or any other amusement that may be preferred.'[1]

'The celebration of New Year's Day,' observes Mr. Hutchinson (Hist. of Northumberland), 'is preserved in this county as a rural festival. Gifts are made to children, servants, and dependants, called New Year's Gifts. Stillingfleet says, 'That among the Saxons of the northern nations, the feast of the new year was observed with more than ordinary jollity;' and, from Hospinian, says, 'It was an antient custom of the Heathens, and afterwards practised by the Christians.' Servants were exempt from their labour, and partook of the feast and rural sports with their masters: they were presented with tokens of approbation and favour. On certain festivals the Romans gave pieces of money to travellers and strangers who were present at the sacrifice. On our day of festivity, mirth is excited by a rustic masquerading

[1] Plumptre's Residence in France, vol. ii, p. 161.

and playing tricks in disguise: the hide of the ox, slain for the winter cheer, is often put on; and the person thus attired, attempts to show the character of the devil, by every horrible device in his power. All the winter sports seem to express a strong opinion of the antients, that genii of very contrary natures prevailed on earth, that the one was constantly concomitant to light as the other was to darkness; and this image of the devil, which is frequently permitted to expel the inhabitants and take possession of the house, is typical of the power of the evil genius, in the season when the sun is longest absent from our hemisphere. This corresponds with the lamentation used by those who held the Elusinian mysteries, and mourned for Adonis. It is very difficult to make any probable determination to what people we owe these customs. In the Roman Saturnalia and Sigillaria, this kind of frolicking was practised.'

The antient custom of going about with the *wassail*, 'a bowl of spiced ale,' is yet retained in many places. The composition was ale, nutmeg, sugar, toast, and roasted crabs or apples, and was called lamb's wool. Some verses still sung in Gloucestershire, on this day, may be seen in T. T. for 1814, p. 3.

There cannot be the smallest doubt (observes Mr. Douce[1]) that the term *wassail* is to be sought for in the well-known story of Vortigern and Rowena, or Ronix, the daughter of Hengist; the earliest authority for which is that of Walter Calenius, who supplied the materials for Geoffrey of Monmouth's history. He relates that on Vortigern's first interview with the lady, she kneeled before him, and presenting a cup of wine, said to him, 'Lord king, *wacht heil*,' or, in purer Saxon, *wæs hæl*; literally, be health, or health be to you! As the king was unacquainted with the Saxon language, he inquired the meaning

[1] Illustrations of Shakspeare, vol. ii, p. 206.

of these words; and being told that they wished him health, and that he should answer them by saying *drinc heil*, he did so, and commanded Rowena to drink. Then taking the cup from her hand, he kissed the damsel and pledged her. The historian adds, that from that time to his own, the custom remained in Britain, that whoever drank to another at a feast said *wacht heil*, and he that immediately after received the cup answered *drinc heil*.

6.—EPIPHANY.

The rites of this day, the twelfth after the Nativity, are different in various places, though the object of them is much the same in all; namely, to do honour to the memory of the Eastern magi, who, according to a tradition of the Romish Church, were three in number, and of royal dignity. The usual celebration of Twelfth-day, in the metropolis and in the south of England, is by drawing lots, and assuming fictitious characters for the evening:—formerly the king or queen was chosen by a *bean* found in a piece of divided cake; and this was once a common Christmas gambol in both the English Universities.

The day after Twelfth Day was called St. Distaff's Day.

'In Northumberland,' says Mr. Hutchinson, 'the mirth of the day consists of feasting and a social intercourse between neighbouring families. In the days of King Ælfrid a law was made with relation to the holydays, by virtue of which the twelve days after the nativity of our Saviour were made festivals. So much as these feasts have been descried, I cannot (continues Mr. Hutchinson, and we partly agree with him), I cannot see them in the despicable light many modern authors have been pleased to place them. They were the occasion of gathering neighbours together, in good humour with each other, and the means of keeping them on terms of intimacy: friendship and benevolence were thereby increased, and good offices multiplied; public matters at such

times were discussed and amicably determined; and those happy effects resulted which tended not only to the advantage of the individual, but to the good of society at large. This age is refined into insipidity: few of the old hospitable days return: sociability is sickened into unmeaning ceremony. In antient times the bard was brought to the festive hall, to rehearse the excellencies of our ancestors, to fire the breast with emulation, to inspire noble and bounteous sentiments, and lift us, through example, into an adoption of the character of those heroes and men of honour from whom we were descended: then it was the genial spirit was roused, and benevolence prevailed. The name of friendship is retained in our language, and the real character is somewhere still found to exist; but it is chiefly in middle life; the great and opulent in general have little experience of it: each apparently separates himself from the community, and is involved in his own circle.'

In France, there is a ceremony of drawing Twelfth-cake, though not quite *à la mode Angloise*. The cake is very plain in its composition, not much better than a bun, only large, so as to cut into slices. In one part a bean is introduced, and the person who draws the slice that has the bean in it, is king or queen, according to the sex of the person by whom it is drawn. Every one then drinks to the health of the new sovereign, who receives the general homage of the company for the evening. The rest of the company have no name or title of distinction.

On the eve of the Epiphany, at Rome, all the fruit and pastry-cooks' shops are splendidly decorated, and are provided with a kind of hobgoblin; which is, in some, a figure, with an ugly mask and fiery eyes, and, in others, a person disguised in the same manner, who plays all kind of tricks. Stockings, filled with oranges, are seen suspended every where, and sometimes letters are fastened to them with pins;—these, lovers present to the objects of their

attachment. In large shops are seen puppets of the size of children of twelve years old, which are seated or standing, and apparently conversing. Each has a stocking stuffed with fruit, hanging at its side.

8.—SAINT LUCIAN.

Lucian, a native of Syria, was celebrated in his youth for his eloquence, and intimate acquaintance with polite literature. After the death of his parents, he gave all his fortune to the poor, and confined himself to the study of the scriptures. He was a proficient in Hebrew, and revised the Septuagint version of the Bible. He wrote an apology for the Christians, and presented it to Maximinus II. After having undergone various torments, at the instigation of this emperor, he was martyred in the year 312.

9.—PLOUGH MONDAY.

On this day, or about this time, in the north, the *fool-plough* goes about, a pageant that consists of a number of sword-dancers, dragging a plough, with music, and one, sometimes two, in a very fantastic dress; the *Bessy*, in the grotesque habit of an old woman, and the *fool*, almost covered with skins, wearing a hairy cap, and the tail of some animal hanging from his back. The office of one of these characters is, to rattle a box among the spectators of the dance, in which he collects their little donations.

The fool-plough, in Germany, is somewhat different. In Franconia, young women are yoked to the plough, upon which a piper sits and plays; and the ladies are then dragged into some river or pool.

13.—SAINT HILARY.

Hilary was born at Poictiers in France, of an illustrious family; and of this place he was chosen bishop in the year 353. Having taken an active part against the Arians, he was banished to Phrygia, by order of the Emperor Constantius, in 356, where he remained for three years. After various travels in different parts, and many sufferings, Hilary died at Poictiers

in 368. He was an excellent orator and poet; his style abounds with rhetorical figures.

18.—SAINT PRISCA.

Prisca, a Roman lady, was early converted to Christianity; but refusing to abjure her religion, and to offer sacrifice when she was commanded, was horribly tortured, and afterwards beheaded, under the Emperor Claudius, in the year 275.

20.—SAINT FABIAN.

St. Fabian succeeded St. Anterus in the pontificate, in the year 236. Eusebius relates, that in an assembly of the people and clergy, held for the election of a pastor in his room, a dove, to the great surprise of all present, settled on the head of St. Fabian; and that this miraculous sign united the votes of the clergy and people in promoting him, though a layman and a stranger. He governed the church sixteen years, sent St. Dionysius and other preachers into Gaul, and condemned Privatus, the promoter of a new heresy in Africa, as appears from St. Cyprian. St. Fabian died a glorious martyr in the persecution of Decius in 250, as St. Cyprian and St. Jerom bear witness. The former, writing to his successor, St. Cornelius, calls him an *incomparable man;* and says, that the glory of his death was equal to the purity and holiness of his life.

21.—SAINT AGNES.

St. Jerom says, that the tongues and pens of all nations are employed in the praises of this saint, who overcame both the cruelty of the tyrant and the tenderness of her age, and crowned the glory of chastity with that of martyrdom. St. Austin observes, that her name signifies *chaste* in Greek, and a *lamb* in Latin. She has been always considered by the Catholics as a special patroness of purity, with the immaculate Mother of God and St. Thecla. Rome was the theatre of the triumph of St. Agnes; and Prudentius says, that her tomb was shown within sight of that city. She suffered not long after the be-

ginning of the persecution of Dioclesian, whose bloody edicts appeared in March in the year of our Lord 303. We learn from St. Ambrose and St. Austin, that she was only thirteen years of age at the time of her glorious death. Her riches and beauty excited the young noblemen of the first families in Rome to vie with one another in their addresses, who should gain her in marriage. Agnes answered them all, that she had consecrated her virginity to a heavenly spouse, who could not be beheld by mortal eyes. Her suitors finding her resolution impregnable to all their arts and importunities, accused her to the governor as a christian; not doubting but threats and torments would overcome her tender mind, on which allurements could make no impression. The judge at first employed the mildest expressions and most inviting promises; to which Agnes paid no regard, repeating always that she could have no other spouse than Jesus Christ. He then made use of threats, but found her soul endowed with a masculine courage, and even desirous of racks and death. At last, terrible fires were made, and iron hooks, racks, and other instruments of torture, displayed before her, with threats of immediate execution. The young virgin surveyed them all with an undaunted eye; and with a cheerful countenance beheld the fierce and cruel executioners surrounding her, and ready to despatch her at the word of command. She was so far from betraying the least symptom of fear, that she even expressed her joy at the sight, and offered herself to the rack. She was then dragged before the idols, and commanded to offer incense; "but could by no means be compelled to move her hand, except to make the sign of the cross," says St. Ambrose.

The governor was highly exasperated to see himself baffled and set at defiance by one of her tender age and sex. Therefore, resolved upon her death, he condemned her to be beheaded. Agnes,

transported with joy on hearing this sentence, and still more at the sight of the executioner, "went to the place of execution, more cheerfully, says St. Ambrose, than others go to their wedding." The executioner had secret instructions to use all means to induce her to a compliance: but Agnes always answered she could never offer so great an injury to her heavenly spouse; and having made a short prayer, bowed down her neck to adore God, and receive the stroke of death. The spectators wept to see so beautiful and tender a virgin loaded with fetters, and to behold her fearless under the very sword of the executioner, who with a trembling hand cut off her head at one stroke. Her body was buried at a small distance from Rome, near the Nomentan road. A church was built on the spot in the time of Constantine the Great, and was repaired by Pope Honorius in the seventh century. It was in the hands of canon regulars, standing *without* the walls of Rome, until the year 1797; and her relics were kept in a very rich silver shrine, the gift of Pope Paul V. in whose time they were found in this church, together with those of St. Emerentiana. The feast of St. Agnes is mentioned in all martyrologies both of the east and west, though on different days. It was formerly a holiday for the women in England, as appears from the council of Worcester, held in the year 1240. Thomas à Kempis relates many miracles wrought and graces received through her intercession.'—*(Butler.)*

This saint is pourtrayed with a *lamb* by her side, from the following circumstance: about eight days after her execution, her parents going to lament, and pray at her tomb, where they continued watching all night, it is *reported* that there appeared to them a vision of angels, arrayed in glittering and glorious apparel; among whom they saw their own daughter, clothed in the same manner, and a lamb standing by her as white as snow. After that time the Roman ladies went every year to present her, on this day,

with the two best and purest white lambs they could possibly procure. These they offered at St. Agnes's altar, and the Pope directs them to be put into the choicest pastures till the time of sheep-shearing arrive: at this season the wool is taken, with which a fine white cloth is made and consecrated every year by the Pope himself, for the palls which he sends to every archbishop; and which till they have purchased at a most extravagant price, they cannot exercise any metropolitical jurisdiction. An allusion to this circumstance occurs in 'Poetical Epistles from Italy, 1794:'

St. Agnes's shrine;
Where each pretty *ba*-lamb most gayly appears,
With ribands stuck round on its tail and its ears;
On gold fringed cushions they're stretched out to eat,
And piously *ba*, and to church-music bleat;
Yet some they seemed crying:—alack and alas!
What's all the white damask to daisies and grass?

On the eve of St. Agnes's day, many kinds of divination are practised by the rustic damsels in the north, to discover their future husbands.

22.—SEPTUAGESIMA SUNDAY.

The institution of this and the two following Sundays cannot be traced higher than the beginning of the sixth or the close of the fifth century. 'When the words Septuagesima, Sexagesima, and Quinquagesima (seventieth, sixtieth, and fiftieth), were first applied to denote these three Sundays, the season of Lent had generally been extended to a fast of six weeks, that is, thirty-six days, not reckoning the Sundays, which were always celebrated as festivals. At this time, also, the Sunday which we call the first Sunday in Lent was styled simply, *Quadragesima*, or the fortieth, meaning, no doubt, the fortieth day before Easter. Quadragesima was also the name given to the season of Lent, and denoted the quadragesimal or forty days' fast. When the three weeks before Quadragesima ceased to be considered as weeks after the Theophany (or Epiphany), and

were appointed to be observed as a time of preparation for Lent, it was perfectly conformable to the ordinary mode of computation to reckon backwards, and, for the sake of even and round numbers, to count by decades.'—*(Shepherd.)*

22.—SAINT VINCENT.

Saint Vincent was born at Osca, near Thesca, in Granada. In the year 303, under Diocletian, Valerius and Vincent were brought before Dacian. The proconsul, turning to these saints, employed alternately threats and promises to induce them to sacrifice. Valerius, who had an impediment in his speech, making no answer, Vincent said to him, 'Father, if you order me, I will speak.' 'Son,' said Valerius, 'as I committed to you the dispensation of the word of God, so I now charge you to answer in vindication of the faith which we defend.' The holy deacon then acquainted the judge that they were ready to suffer all extremities for the true God, and little regarded either his threats or promises in such a cause. Dacian contented himself with banishing Valerius. As for Vincent, he was determined to assail his resolution by every torture his cruel temper could suggest. St. Augustin assures us, that he suffered severer torments than any man could possibly have endured unless supported by a supernatural strength; and that he preserved such a peace and tranquillity of mind, which appeared in his words, countenance and gestures, in the midst of them, as astonished his very persecutors; while the rage and distraction of Dacian's soul were visible in the violent agitations of his body, the fury which sparkled in his eyes, and his faltering voice.

The martyr was first stretched on the rack with his hands and feet drawn by cords and pullies, till his joints were almost torn asunder: while he hung in this posture, his flesh was barbarously torn off with iron hooks. Vincent, smiling, called the executioners weak, and faint-hearted. Dacian thought they spared

him, and caused them to be beaten, which afforded the champion an interval of rest: but they soon returned to him, resolved fully to satisfy the cruelty of their master, who excited them all the while to exert their utmost strength. Twice they stayed their hands to take breath and let his wounds grow cold; then began with fresh vigour to tear his body, which they did in all its limbs and parts with such cruelty, that his bones and bowels were in most places exposed to view. The more his body was mangled, the more did the divine presence cherish and comfort his soul, and spread a greater joy on his countenance. The judge seeing the streams of blood which flowed from all the parts of his body, and the frightful condition to which it was reduced, was obliged to confess with astonishment, that the courage of the young nobleman had vanquished him, and his rage seemed somewhat to abate. Hereupon he ordered a cessation of his torments, begging of the saint for his own sake, that if he could not be prevailed upon to offer sacrifice to the gods, he would at least give up the sacred books to be burnt, according to the order of the late edicts. The martyr answered, that he feared his torments less than that false compassion which he testified. Dacian, more incensed than ever, condemned him to the most cruel of all tortures, that of fire upon a kind of gridiron, called, by the acts, the *legal torture*. The saint walked with joy to the frightful engine, so as almost to get the start of his executioners; such was his desire to suffer. He mounted cheerfully the iron bed, in which the bars were framed like scythes, full of sharp spikes, made red hot by the fire underneath. On this dreadful gridiron the martyr was stretched out at length, and bound fast down. He was not only scourged thereon, but, while one part of the body was broiling next the fire, the other was tortured by the application of red-hot plates of iron. His wounds were rubbed with salt, which the activity of the fire

forced the deeper into his flesh and bowels. All the parts of his body were tormented in this manner, one after the other, and each several times over. The encircling flames, instead of tormenting, seemed, says St. Augustin, to give the martyr new vigour and courage; for the more he suffered, the greater seemed to be the joy and consolation of his soul. The rage and confusion of the tyrant exceeded all bounds: he appeared not able to contain himself, and was continually inquiring what Vincent did, and what he said; but was answered, that he suffered with joy in his countenance, and seemed every moment to acquire new strength and resolution. He lay unmoved with his eyes turned towards heaven, his mind calm, and his heart fixed on God in continual prayer.

At last, by the command of the proconsul, he was thrown into a dungeon, and his wounded body laid on the floor strewed with broken potsherds, which opened afresh his wounds, and cut into his flesh. His legs were set in wooden stocks, stretched very wide, and strict orders were given that he should be left without provisions, and that no one should be permitted to see or speak to him. But God sent his angels to comfort him, with whom he sung the praises of his protector. The jailer observing through the chinks the prison filled with light, and the saint walking and praising God, was converted on the spot to the christian faith, and afterwards baptized. At this news Dacian was much chagrined, and wept with rage, but ordered that some repose should be allowed the prisoner. The faithful were then permitted to see him, and, coming in troops, wiped and kissed his wounds, and dipped cloths in his blood, which they kept as an assured protection for themselves and their posterity. After this a soft bed was prepared for him, on which he was no sooner laid but he expired. Dacian commanded his body to be thrown on a marshy field among rushes; but it

was in a miraculous manner preserved from birds of prey and other animals. The acts in Ruinart and Bollandus, and the sermon attributed to St. Leo, add, that it was then tied to a great stone and cast into the sea in a sack, but miraculously carried to the shore, and discovered by revelation to two christians. They laid it in a little chapel without the walls of Valentia, where God honoured these relics with many miracles, as the Acts and St. Augustin witness. Prudentius informs us, that the iron on which he lay, and other instruments of his martyrdom, were likewise preserved with veneration. In the year 855, his bones were discovered at Valentia, and conveyed into France, and deposited in the abbey of Castres in Languedoc, where they remained down to the late disturbances; but several portions had been given to the abbey of St. Germain des Pres at Paris, and other churches; and part was burnt at Castres by the Huguenots about the end of the sixteenth century. Aimoinus, a contemporary author, wrote the history of this translation, with an account of many miracles which attended it[1].'

25.—CONVERSION OF SAINT PAUL.

Saint Paul suffered martyrdom under the general persecution of Nero. Being a Roman citizen, he could not be crucified by the Roman laws, as his colleague St. Peter was; he was, therefore, beheaded:—hence the usual representation of him with a sword in his hand. St. Chrysostom tells us that his picture was preserved by some of the christians in his time, and that he was but of a low stature (three cubits), that is, four feet six inches high. Nicephorus describes him as a small man, somewhat crooked, of a pale complexion, and appearing older than he really was.

[1] See Butler's Lives of the Saints abridged, vol. i, p. 108-110.

29.—SEXAGESIMA SUNDAY. *See* Septuagesima, p. 11.

30.—KING CHARLES I, MARTYR.

Many interesting particulars of the private life of Charles I are recorded in Warwick's Memoirs. 'His deportment was very majestic; for he would not let fall his dignity, no not to the greatest foreigners that came to visit him and his court: for though he was far from pride, yet he was careful of majesty, and would be approached with respect and reverence. His conversation was free; and the subject matter of it, *on his own side of the court*, was most commonly rational; or if facetious, not light.

'With any artist or good mechanic, traveller, or scholar, he would discourse freely; and as he was commonly improved by them, so he often gave light to them in their own art or knowledge: for there were few gentlemen in the world that knew more of useful or necessary learning than this prince did; and yet his proportion of books was but small, having, like Francis the First of France, learnt more by the ear than by study. His way of arguing was very civil and patient; for he never contradicted another by his authority, but by his reason; nor did he by petulant dislike quash another's arguments; and he offered his exception by this civil introduction, "By your favour, Sir, I think otherwise, on this or that ground;" yet he would discountenance any bold or forward address unto him. And in suits, or discourses of business, he would give way to none abruptly to enter into them, but looked that the greatest persons should in affairs of this nature address to him by his proper ministers, or by some solemn desire of speaking to him in their own persons.

'His exercises were manly, for he rid the great horse very well; and on the little saddle he was not only adroit, but a laborious hunter, or field-man. He had a great plainness in his own nature, and yet he was thought, even by his friends, to love too much a

versatile man; but his experience had thoroughly weaned him from this at last.

'He kept up the dignity of his court, limiting persons to places suitable to their qualities, unless he particularly called for them. Besides the women who attended on his beloved Queen and Consort, *the Lady Henrietta Maria, sister of the French King,* he scarce admitted any great officer to have his wife in the family.

'His exercises of religion were most exemplary; for every morning early, and evening, not very late, singly and alone, in his own bed-chamber, or closet, he spent some time in private meditation *(for he dared reflect and be alone)*; and through the whole week, even when he went to hunt, he never failed, before he sat down to dinner, to have part of the Liturgy read to him and his menial servants, came he ever so hungry or late in: and on Sundays and Tuesdays he came, commonly at the beginning of service, well attended by his court lords and chief attendants, and most usually waited on by many of the nobility in town, who found those observances acceptably entertained by him. His greatest enemies can deny none of this; and a man of this moderation of mind could have no hungry appetite to prey upon his subjects, though he had a greatness of mind not to live precariously by them. But when he fell into the sharpness of his afflictions *(than which few men underwent sharper)*, I dare say I know it (*I am sure conscientiously I say it*), though God dealt with him, as he did with St. Paul, not remove the thorn, yet he made his grace sufficient to take away the pungency of it; for he made as sanctified an use of his afflictions as most men ever did.

'As an evidence of his natural probity, whenever any young nobleman or gentleman of quality who was going to travel, came to kiss his hand, he cheerfully would give them some good counsel leading to moral

virtue, especially to good conversation; telling them, that if he heard they kept good company abroad, he should reasonably expect they would return qualified to serve their king and country well at home; and he was careful to keep the youth in his time uncorrupted.

'The King's deportment at his trial, which began on Saturday the 20th of January 1648, was very majestic and steady; and though usually his tongue hesitated, yet at this time it was free, for he was never discomposed in mind: and yet, as he confessed himself to Bishop Juxon, who attended him, one action shocked him very much; for whilst he was leaning in the court upon his staff, which had a head of gold, the head broke off on a sudden: he took it up, but seemed unconcerned; yet told the bishop, it really made a great impression on him; and to this hour, (says he) I know not possibly how it should come. It was an accident I myself have often thought on, and cannot imagine how it came about; unless Hugh Peters, who was truly and really his gaoler (for at St. James's nobody went to him but by Peters's leave), had artificially tampered upon his staff. But such conjectures are of no use.

'His speech on the scaffold to the people was very worthy of himself. This part of it became his great wisdom, when he told them, they mistook the nature of government; for people are free under a government, not by being sharers in it, but by the due administration of the laws of it. After having prayed with the bishop, and by himself, he submitted cheerfully unto the providence that was dispensed unto him: but he took notice of some engines his murderers had made, that, in case he would not willingly submit, they might by violence have pulled him down; at which he smiled, as if he had been contented that they shewed the barbarity of their natures, and he the equanimity of his own. At last he laid

down his head, stretched out his hand as the sign, and the executioner let drop the hatchet, which severed it from the body, January 30, 1648[1].'

His body after his execution was embalmed, laid in a coffin of lead, and buried in St. George's chapel, Windsor, in a vault, in which were the coffins of Henry VIII, and Queen Jane, his third wife. This fact, though much controverted, has lately been ascertained by Sir H. Halford, who opened the coffin at the express desire of the Prince Regent. See T.T. for 1814, p. 8.

The sufferings of Charles are thus bewailed by Tickell:—

> Where, then, just Heaven, was thy unactive hand,
> Thy idle thunder, and thy ling'ring brand;
> Thy adamantine shield, thy angel-wings,
> And the great Genii of anointed Kings?
> Treason and fraud shall thus the stars regard,
> And injured virtue meet this sad reward?
> So sad, none like can Time's old records tell,
> Though Pompey bled, and poor Darius fell.
> All names but one too low,—that one too high;
> All parallels are wrongs, or blasphemy!

Charles I, though of abstemious habits, kept a splendid and hospitable table at the beginning of his reign. Of this trait in his character, hitherto unnoticed, the following account affords a sufficient proof[2].

'There were daily in his court eighty-six tables, well furnished each meal, whereof the king's table had twenty-eight dishes; the queen's twenty-four; four other tables, sixteen dishes each; three other, ten dishes each; twelve other had seven dishes each;

[1] Clarendon's character of Charles I is, that 'he was the worthiest gentleman, the best master, the best friend, the best husband, the best father, and the best christian, that the age in which he lived produced.'

[2] We copy it from the *New Monthly Magazine*, vol. i, p. 20, where it is given on the authority of a corresponda nt, as having been found among some old papers.

seventeen other tables had each of them five dishes; three other had four each; thirty-two other tables had each three dishes; and thirteen other had each two dishes; in all about five hundred dishes each meal, with bread, beer, wine, and all other things necessary. All which was provided most by the several purveyors, who, by commission, legally and regularly authorized, did receive those provisions at a moderate price, such as had been formerly agreed upon in the several counties of England, which price (by reason of the value of money much altered) was become low, yet a very inconsiderable burthen to the kingdom in general, but thereby was greatly supported the dignity royal in the eyes of strangers as well as subjects. The English nobility and gentry, according to the king's example, were excited to keep a proportionable hospitality in their several country mansions, the husbandmen encouraged to breed cattle, all tradesmen to a cheerful industry: and there was then a free circulation of monies throughout the whole body of the kingdom. There was spent yearly in the king's house of gross meat fifteen hundred oxen, seven thousand sheep, twelve hundred veals, three hundred porkers, four hundred starks or young beefs, six thousand eight hundred lambs, three hundred flitches of bacon, and twenty-six hams; also one hundred and forty dozen of geese, two hundred and fifty dozen of capons, four hundred and seventy dozen of hens, seven hundred and fifty dozen of pullets, one thousand four hundred and seventy dozen of chickens: for bread three thousand six hundred bushels of wheat; and for drink six hundred tun of wine, and one thousand seven hundred tun of beer: moreover of butter forty-six thousand six hundred and forty pounds, together with fish and fowl, venison, fruit and spice proportionably.'

A brutal and unmanly insult to the memory of this martyred sovereign was offered by the adherents of

Cromwell in the institution of the CALVES' HEAD CLUB, the orgies of which were celebrated so late as the year 1735. See T.T. for 1814, p. 10.

Astronomical Occurrences.

Of the Inferior Planets.

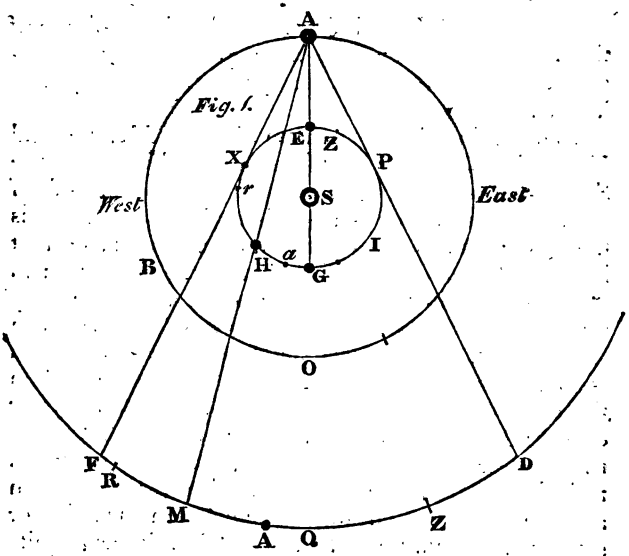
WE shall, as prefixed to the Occurrences of the several months of the ensuing year, illustrate such terms and subjects as it is necessary the young astronomer should be well acquainted with, and which he will find referred *to* in several parts of the present volume.

In pages 65-8 and 93-6 of the first volume of the Time's Telescope, we have given pretty full account of the two inferior planets, Mercury and Venus.

In observing the apparent motions of Mercury and Venus, it will appear that they always keep near the Sun; that is, they are always seen on the same side of the heavens in which that luminary is, and hence it is that these planets are evening and morning stars; that is, when they are seen a little before the rising Sun in the morning, they are morning stars, and when they remain a little after he has gone before the horizon in the evening, they are evening stars. Mercury indeed is so seldom seen, that he is not often mentioned in the connection. His distance from the Sun never exceeds 27 or 28 degrees, which is the magnitude of the greatest angle that is made by two lines supposed to be drawn from the eye of the observer to the Sun and that planet. The difference between the rising or setting of Mercury, and that of the Sun, is never quite two hours. When Mercury first begins to appear after Sun-set, in the west, he is nearly obscured by the glare of twilight. On the following evenings his distance from the Sun increases till it arrives at its greatest *elongation* from the Sun, which varies according to the position of the earth and planet, from 17½° to

28½°. The planet then appears to be *stationary;* and afterwards moves backwards in a *retrograde* direction. A short time after this Mercury may be seen in the morning before Sun-rise. The cause of these phenomena, and the explanation of the terms printed in *italics,* are the objects of the following observations.

The *Elongation* of a planet is its apparent distance from the Sun; and an inferior planet is in its *inferior* conjunction when it is directly between the Earth and Sun; and in its *superior* conjunction when the Sun is directly between the earth and planet.



Thus, in the above *fig.*, if A be the place of the Earth in its orbit ABO; E the place of Mercury or Venus in its orbit EHI; S the place of the Sun, and FD represent an arc of a circle in the heavens; the planet will be in its inferior conjunction when it is at E, and at its superior conjunction when it is at G.

An inferior planet is at its *greatest elongation*, when a line drawn from the Earth through the planet is a tangent to the orbit of the planet. Thus when the planet is at E, being in conjunction with the Sun, it has no elongation, as it moves from E to X its elongation increases till at X, when AF is a tangent to the orbit of the planet; its apparent place is F, and its elongation is measured by FQ or the angle FAQ, which angle is made by lines supposed to be drawn from the observer at A, through the planet at X, and through the Sun at S. *This is the greatest* elongation it can have; for, in passing from X to G as at H, its elongation decreases (for the angle MAQ is less than FAQ) till at G; it being then again in conjunction, it becomes nothing.

I. When an inferior planet is passing from its greatest elongation, through its superior conjunction, to its greatest elongation on the other side, the motion as seen from the Earth is *direct*, or it appears to move from west to east. To take Venus as an example. When the planet is at X, it appears to a spectator at A to be in the point F of the heavens: when it has moved forward in its orbit to H, G, I, P, it will appear to be successively in the points M, Q, Z, D, but the motion from F to D is from west to east; for while the Sun and Earth are on the same side of the planet, it must appear to move in the same direction, whether it be viewed from the Earth or the Sun, because the spectator, at either station, views the concave side of the planet's orbit; but from the Sun it is always seen to move from west to east, therefore its apparent motion, to a spectator on the Earth, in this situation is *direct*.

II. When an inferior planet is moving from the greatest elongation on one side to the greatest elongation on the other, through the inferior conjunction, its motion to a spectator on the Earth is *retrograde*, or from east to west. For, while the planet is in this situation, the *convex* side of its orbit is towards a

spectator on the Earth, but the *concave* side is towards a spectator at the Sun: hence the former will see the planet move in a direction contrary to that in which it will appear to the latter to move. Thus, when the planet is at P, it will appear in the heavens at D; and when it has passed from P to *z*, it appears to have gone back in the heavens from D to Z, that is, to have made a retrograde motion, and so it continues till the planet has arrived at X; for during its course from P to X, the apparent tract in the heavens will be from D to F, or from east to west, therefore the apparent motion of the planet in this part of its orbit is retrograde.

III. When an inferior planet is at its greatest elongation, it appears to a spectator on the Earth *stationary*. At either of the greatest elongations, P or X, of the planet Venus, AD or AF is a tangent to the orbit which so nearly coincides with a small portion of the curve, that a spectator's eye at A could not distinguish the tangent from this part of the curve: consequently a planet, while in that part of the curve, will appear to lie in the tangent AD, and as the motion of a distant body coming in a direct line to the eye cannot be discerned, the planet will appear stationary in the point D or F.

In the foregoing observations, the Earth's motion in its orbit has not been regarded, because the only effect of this motion on the appearances just described, is that they take place in different parts of the heavens; whereas, if the Earth were immoveable at A, while the inferior planets were making their circuit about the Sun, their motions would be direct, or retrograde, and they would appear stationary always in the same part of the heavens.

IV. An inferior planet is never in *opposition* to the Sun. For, in opposition, the Earth A must be situated between the planet and the Sun, which can never happen, because it is evident, from the figure, that the orbit of the planet is within that of the

Earth; and, therefore, it must always be nearer the Sun than the Earth is.

A planet is in *Quadrature* when it is ninety degrees distant from the Sun.

V. An inferior planet can never be in quadrature. Because the greatest elongation is that contained by AQ, drawn from the Earth through the Sun, and AF a tangent to the orbit of the inferior planet; but the angle QAF cannot be ninety degrees, unless AF is a tangent to the Earth's orbit, therefore QAF, the greatest elongation of an inferior planet, that is, of one whose orbit is included in that of the Earth, must be less than ninety degrees, and of course the planet cannot be in quadrature.

VI. The apparent velocity of the inferior planets is greatest at the conjunctions. For supposing the motion of the planet in its orbit uniform, it will describe the equal arcs Xr and *a*G in equal times, but to a spectator at A, the velocity of the motions will be as the apparent arcs described in the heavens, that is as FR is to AQ; but AQ representing the velocity of the planet at or near the conjunction, is much greater than FR, which represents its velocity at Xr.

As the Sun enlightens only one half of a planet, and only one half of a planet can be visible at once, it is evident from the figure, that when Venus or Mercury is at E, its dark side is next the Earth, and it is invisible to the inhabitants of the Earth: when it arrives at X, a part of its illuminated disk is seen: a still greater part is visible when it arrives at H, and at G the whole illuminated side is opposite to the Earth at A.

Hence Venus and Mercury, when viewed with a good telescope, in passing from the inferior to the superior conjunction, are observed to have all the phases of the Moon from new to full.

TABLE.

Taking intervals of ten days through the month,

the times of the Sun's rising and setting, at London, will be,

Sunday	1st,	Sun rises 8 h. 5 m.	Sun sets 3 h. 55 m.
Wednesday	11th,	7 h. 56 m.	4 h. 4 m.
Saturday	21st,	7 h. 44 m.	4 h. 16 m.

Equation of time, is the adjustment of the difference of time, as shown by a well regulated time-piece, and a true sun-dial. An accurate time-piece measures that equable time which is exhibited by the rotation of the Earth on its axis; whereas the dial measures time by the apparent motion of the Sun, which, as was pointed out in the former volume, is subject to variation. Equal or true time is measured by an accurate clock or watch; apparent time is shown on the dial. To find *true* time, we must *add* or *subtract*, as the case may require, a certain number of minutes and seconds to *apparent* time, as it is shown on the sun-dial.

The following table will show what is to be added for every fifth day of the month of January:

	m.	s.
Sunday, January 1, to the time marked on the dial *add*	3	41
Friday, 6,	5	59
Wednesday 11,	8	6
Monday 16,	9	59
Saturday 21,	11	34
Thursday 26,	12	49
Tuesday 31,	13	45

By looking on the Ephemeris, Almanack, &c. it will be seen at the head of the month January, *Clock before the Sun:* that is, if a clock shows true accurate time, it must be, on the sixth day, near six minutes faster than the Sun, and on the sixteenth nearly ten minutes: the foregoing table shows on each fifth day how many minutes the clock must be before the time on the dial, and supposing them both together on any given day, say the 26th, then the clock, to show true time, must be put forward 12 m. 49 s. The reason of this is fully explained in 'Time's Telescope' for 1814, p. 60-3.

The Sun enters the sign Aquarius on the 20th, at 21 m. after eight in the evening.

The new Moon or change happens at 57 m. after one at noon, on the 10th, at which time the Sun will be eclipsed, but the phenomenon will not be visible in this country: it will be centrally eclipsed in west longitude, 26° 30′¼, and south latitude 63° 45′¼. Full Moon happens at 47 m. after nine in the morning of the 25th.

Jupiter appears stationary on the 26th, that is, as has been explained above, a line drawn from the Earth to Jupiter will be a tangent to the orbit of that planet, and for some time he will not appear to change his place in the heavens. The Moon will appear on the meridian at 45 m. past five in the morning of the 2d day of January; at 42 m. past six in the evening of the 19th; and at 32 m. past ten on the 23d.

The young astronomer may be informed that the eclipses of Jupiter's first satellite will be visible at the following times in the course of this month:

7th day,	36 m.	after 3 in the morning.
13th	57	—— midnight.
23d	50	—— 1 in the morning.
30th	44	—— 3 ditto.

Mercury will be in her superior conjunction, that is, at G (see fig. 1, p. 22), at half past three o'clock in the morning of the 31st.

Saturn's conjunction will happen at half past eleven on the 23d, in the evening.

HISTORY OF ASTRONOMY.

In the earliest ages of the world the heavenly bodies were probably observed as objects of terror rather than as subjects calculated to inspire veneration and excite curiosity. It is well ascertained that at a very early period the Sun and Moon were regarded, either as the gods from whom flowed the blessings most important to human existence, or as the emblems of

the Great Being by whom the universe was created, and hence they attracted a degree of attention which they never could have excited when considered only as inanimate portions of matter. The uncivilized inhabitants of the earth recognized, without doubt, their dependence on the luminaries of heaven, and in their nightly excursions, to which they were impelled by hunger, they must have watched with an anxiety of which we can form no conception for the returning Moon to light them to their haunts. But when man began to draw his subsistence from less precarious resources, he was excited to the contemplation of the stars by different and more powerful motives. The rudest operations with which he cultivated the soil, he would soon see were dependant on the varying motions of the Sun, and hence he would be under the necessity of observing and recollecting the changing seasons, and fix in his rude calendar the period of their return. The observations which were thus made through the feeling of necessity, would in a temperate climate, and beneath a serene sky, be continued when that impulse was withdrawn, and astronomy would then be studied as a science, when man began to exercise his intellectual faculties, and feel the pleasure which springs from knowledge, however small its beginnings might be. We of course find, in the very remote ages, when history and tradition begin to throw their mingled though confused light over the affairs of the world, that the rising and setting of the principal stars had been carefully observed, and that the phases and eclipses of the Moon and her occultation of the stars had been frequently recorded. By observing the times when the principal stars were lost in the light of the Sun in the morning, and when they emerged from his beams in the evening, the progress of the Sun was traced through the heavens, and the course of the Moon and planets was carefully marked by their approach to the fixed stars which are situated in their path. The revolution which the Sun appeared to per-

form in the starry firmament, embraced all the variety of seasons, and a narrow zone which encircled his path comprehended the orbits of all the other planets. To distinguish therefore the seasons, and to determine the motions and positions of these wandering bodies, the zone, which the antients called the zodiac, was divided into 12 constellations or signs, which were descriptive either of the motion of the Sun, or of those operations in agriculture and those changes of the weather which marked the entrance of that body into those divisions. These divisions are still in use; and in our Astronomical Occurrences, besides the other observations, there will be found the precise minute when the Sun enters each of the 12 signs during the year.

Among the earliest astronomical observations of which we have any distinct notice, is the account of three eclipses of the Moon which were accurately observed at Babylon, in the years 719 and 720 before the christian æra. Ptolemy, who made use of these eclipses for determining the mean motion of the Moon, has recorded four other lunar eclipses, of which the last was observed at Babylon, about the year 367 B.C.

The astronomical knowledge of the Chaldeans was unequivocally marked by their period of eclipses which they called *Saros*, and which consisted of 223 lunations, equal, according to their calculation, to 6585 days 8 hours, at the end of which the Moon returned to the same position with regard to the Sun. The eclipses, therefore, which were observed during one period, enabled them to predict those that would happen in the following period, and all the other phenomena which result from the combined motion of the two luminaries. The accurate tables of some modern astronomers make this period 6585 days, 7 hours, 42 minutes, and 31 seconds, so that the error of the Chaldean astronomers amounted only to 17

minutes and 29 seconds. Such a degree of accuracy could not have been expected, and is almost incredible.

The Chaldeans made their tropical year to consist of 365 days, 5 hours, 49 minutes, and 30 seconds, which has led modern astronomers to infer that they were acquainted with the precession of the equinoxes, of which we shall speak in another part of the volume. They considered the comets as subject to the same laws as those by which the planets are governed, but revolving in orbits which receded to a greater distance from the earth. They conjectured that the eclipses of the Sun were caused by the interposition of the Moon; but though they seem to have been well acquainted with the sphericity of the earth, they do not seem to have guessed at the cause of lunar eclipses. According to the testimony of Diodorus Siculus, these people were acquainted with the periods of all the planets, and they regarded the Moon as the smallest of the heavenly bodies, and of course the nearest to the earth.

It cannot be ascertained whether astronomy was first cultivated in Egypt or Chaldea. The Egyptians, from the *heliacal* rising of Sirius, ascertained the length of the year to be 365¼ days; and they were probably at a very early period acquainted with the revolution of Mercury and Venus round the Sun, and the order which the planets held in the system, and hence they were also acquainted, it is thought, with the direct and retrograde motions, and with the stationary appearance which they sometimes make. The Egyptians, it is known, paid great attention to eclipses, and Conon, the friend of Archimedes, collected an account of many eclipses of the Sun that had been observed by them. Thales appears to have received from the Egyptians his method of predicting an eclipse of the Sun; and according to Diogenes Laertius, they were acquainted with the spherical form of the earth, and that the Moon was eclipsed by entering its shadow.

'These facts,' says the historian, 'few and imperfect as they are, sufficiently impress us with a high sense of the astronomical knowledge of the Egyptians; but whatever opinion we may entertain of the extent of their attainments, and the antiquity of their observations, we must consider that enlightened country as the hallowed spot from which science was diffused over Europe, and as the source from which Greece derived the most precious of her intellectual treasures.'

The Persians and Phœnicians, from their local situation, must probably have had frequent intercourse with Egypt and Chaldea, and they seem to have drawn from these favoured kingdoms a considerable portion of astronomical knowledge. The year of the Persians consisted of 365 days, and as they were acquainted with the length of the Sun's period, they added an intercalary month at the end of every 120 years, and it appears that their period of intercalation was established about 820 years before Christ. It has been discovered in the Persian books, that there were formerly four bright stars, which pointed out the four cardinal points of the heavens; and it has been observed as a very remarkable coincidence, that about 3000 years before the christian æra, Aldebaran and Antares were situated exactly in the two equinoctial points, while Regulus and the Southern Fish were placed in the two solstices. While other nations were applying astronomy merely to the purposes of agriculture and chronology, the Phœnicians were employing the stars to guide their steps through the trackless ocean, in those grand maritime enterprises which have associated their names with the earliest history of commercial discovery. Their acquaintance with the Ursa-minor enabled them to conduct colonies to the remote regions of Europe, and transplant into the most savage climes the arts and sciences which were cultivated in the east.

We shall, for the present, omit the early history of astronomy connected with China and India, in order

to pursue it in the regions of Greece, where it had been transplanted from Egypt and Phœnicia. So early as the 13th century before the Christian æra, the position of the stars, with regard to the circles of the sphere, had been established in Greece with a considerable degree of exactness; a strong proof that the sphere described by Eudoxus, to which we shall again refer, was the production of a more perfect system of astronomy, and that the Greeks merely changed the names of the constellations in honour of the famous Argonauts. In this fabulous period of Grecian history, it is impossible to ascertain the state of astronomical science, or even to recount the names of the individuals who contributed to its progress. Atlas and Hercules, Linus, Orpheus, and Palamedes, are all mentioned as improvers of this noble science. It was said of Palamedes, who flourished at the time of the Trojan war, that he was the inventor of weights and measures; that he regulated the length of the year by the apparent course of the Sun, and of the month by that of the Moon; and that in more close connection with the present subject, he was able, according to the testimony of the poet Sophocles,

> To mark the signs that cloudless skies bestow,
> To tell the seasons when to sail and plow,
> He first devised; each planet's order found,
> Its distance, period, in the blue profound.

[To be continued.]

The Naturalist's Diary.

> A *dreadful winter* came; *each day* severe,
> *Misty* when mild, and *icy-cold* when clear.
>
> CRABBE.

THE gloomy uniformity which now reigns throughout almost every part of creation, naturally impels the contemplative mind to look for relief in the extraordinary changes and agitations which the elements undergo during this season. Scenes are presented to the

view, which, were they less frequent, must strike with wonder and admiration the most incurious spectator.

The effects of cold are more sudden, and, in many instances, more extraordinary and unexpected, than those of heat. He, who has beheld the vegetable productions of even a northern summer, will not be greatly amazed at the richer and more luxuriant, but still resembling growths of the tropics. But one, who has always been accustomed to view water in a liquid and colourless state, cannot form the least conception of the same element, as hardened into an extensive plain of solid crystal, or covering the ground with a robe of the purest white. The highest possible degree of astonishment must, therefore, attend the first view of these phenomena; and as, in our temperate climate, but a small portion of the year usually affords such spectacles, we find that, even here, they have novelty enough to excite agreeable emotions.

But, it is not to their novelty alone that they owe their charms. Their intrinsic beauty, perhaps, is individually superior to that of the gayest objects presented by other seasons. Where, indeed, is the elegance and brilliancy that can compare with that which decorates every tree and bush on the clear morning succeeding a night of hoar-frost? Or, what is the lustre that would not appear dull and tarnished, in competition with a field of snow just glazed over with a frosty incrustation? What can be more beautiful than the effect of snow and frost at a mill-dam, or rather, where the mill-wheel dashes? Cowper has given us a most picturesque description of this circumstance, when he tells us how 'scornful of a check' the 'snowy weight' leaps

> The milldam, dashes on the restless wheel,
> And wantons in the pebbly gulf below:
> No frost can bind it there; its utmost force
> Can but arrest the light and smoky mist,
> That in its fall the liquid sheet throws wide.

And see where it has hung th' embroidered banks
With forms so various, that no pow'rs of art,
The pencil or the pen, may trace the scene!
Here glitt'ring turrets rise, upbearing high
(Fantastic misarrangement!) on the roof
Large growth of what may seem the sparkling trees
And shrubs of fairy land. The crystal drops,
That trickle down the branches, fast congealed,
Shoot into pillars of pellucid length,
And prop the pile they but adorned before.

We have been led to extend these observations on frost, snow, and ice, by the very extraordinary opportunities which have been afforded to us, in the past year, of contemplating the wonders of an almost northern winter.

The year 1813 might be said to close in darkness; for scarcely was any part of the country around the metropolis, for many miles, free from those uncommonly dense, stagnant, and light-opposing vapours, which involved the whole of London, and its adjacencies, for seven days, without intermission. This fog was followed by a succession of snows, which falling every day, shortly raised mountains, not in London only, but throughout the kingdom. Severe frost succeeded, and completed the inclemency of the season.

But these inclemencies were not confined to the British islands. They extended almost entirely over the continent of Europe; and at Blois, in the south of France, so late as the 14th of March, the Loire presented, in many places, a solid sheet of ice;—a remarkable phenomenon, indeed, in a country where the customary temperature of this month is at 50°, and where spring, at this time, is usually clad in all its milder beauties.

In England, this long frost (which continued, with little intermission, from Dec. 27th to Feb. 5th) was severely felt by all classes of persons: unaccustomed to fence against the intense cold of a Russian climate, we suffered infinitely more than the inhabitants of that region, who walk out cased in furs, and, provided with every species of protection against cold

within doors, defy with impunity all the rigours of a Siberian winter[1].

Neither were we prepared to enjoy the amusements and delights which transport the sons of the north into joy at the sight of falling snow. Our horses were not accustomed to travel on beaten snow as on a solid road, nor our beaux and belles to hazard themselves in traineaus, or to slide in wheelless carriages down hills of ice.

Among the many extraordinary objects which were presented to the eye, during this severe frost, the state of the river Thames was not the least singular. Vast pieces of *floating* ice, laden with heaps of snow, were seen on the surface, in every direction. Sometimes they formed a chain of glaciers—one moment, united, and at another, clashing, and cracking, and dashing in a singular and awful manner. These 'alps of ice' at length became firmly cemented like a solid rock of adamant, and presented a truly picturesque appearance. The view of St. Paul's Cathedral, and of the houses, with the white fore-ground, had a very singular effect; many parts, on which mountains of ice were upheaved, bore a strong resemblance to the rude interior of a stone quarry. A full Moon added much to the picturesque beauty of the scene. At another time, when the thaw had commenced, the Thames afforded towards high tide a very tolerable idea of the frozen ocean; grand masses of ice floating along in 'silent majesty,' added to the great height of the water, presented a striking object for contemplation.

[1] On the approach of winter, in Russia, double windows are put up in all the houses, having the joints and interstices caulked and neatly pasted with paper. This precaution not only fences against cold and wind, but secures a free prospect even in the depth of winter, as the panes of glass are thus never incrusted with ice. The outer doors, and frequently the floors, under the carpets, are covered with felt. The stoves produce a temperature in the most spacious apartments and halls which annihilates all thoughts of winter.

Of the rural scenery during this remarkable frost, Virgil has furnished a pretty accurate description, in his poetical picture of a Scythian winter:

Early they stall their flocks and herds; for there
No grass the fields, no leaves the forests wear:
The frozen earth lies buried there, below
A hilly heap, sev'n cubits deep in snow;
And all the west allies of stormy Boreas blow.
The Sun, from far, peeps with a sickly face;
Too weak the clouds and mighty fogs to chase;
When up the skies he shoots his rosy head,
Or in the ruddy ocean seeks his bed.
Swift rivers are with sudden ice constrained,
And studded wheels are on its back sustained.
An hostry now for waggons, which before
Tall ships of burden on its bosom bore.
Mean time, perpetual sleet and driving snow
Obscure the skies, and hang on herds below:
The starving cattle perish in their stalls,
Huge oxen stand inclosed in wintry walls
Of snow congealed; whole herds are buried there
Of mighty stags, and scarce their horns appear'.

But we must now return to an enumeration of those various changes which take place in the kingdom of nature during the present month; such, at least, we hope as will again mark the appearance of January, unaccompanied by the almost Spitzbergen winter of 1814.

In the commencement of this month, numerous birds quit their retreats, in search of food.

The fowls of heaven,
Tamed by the cruel season, crowd around
The winnowing store, and claim the little boon
Which Providence assigns them. One alone,
The *redbreast*, sacred to the household gods,
Wisely regardful of the embroiling sky,
In joyless fields and thorny thickets leaves
His shivering mates, and pays to trusted man
His annual visit.

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* We must here close our allusions to the extraordinary frost of 1814; referring our readers to an interesting little work on this subject under the whimsical title of "Frostiana."—It may be had of our publishers.

The redbreast (*sylvia rubecula*) pays our attention with a song[1]. Larks (*alauda arvensis*) congregate, and fly to the warm stubble for shelter; and the nuthatch (*sitta europæa*) is heard. The shelless snail or slug (*limax*) makes it appearance. The missel-thrush (*turdus viscivorus*) begins its song. The hedge-sparrow (*sylvia modularis*), and the thrush (*turdus musicus*), begin to sing. The titmouse (*parus*) pulls straw out of the thatch, in search of insects. This bird is also very active in climbing and running about the trees for the same purpose, and the redbreasts search about the holes of walls for snails. The latter, towards the close of autumn, retire into walls and decayed trees, and so agglutinate themselves together, by means of the viscous fluid with which their bodies are abundantly supplied, as enable them, if undisturbed, to preserve life, even through the most inclement winter.

Linnets (*fringilla linota*) congregate; and rooks (*corvus frugilegus*) resort to their nest trees. The house-sparrow (*fringilla domestica*) chirps; the bat

[1] In the beautiful invitation to a redbreast by Vincent Bourne, translated by the amiable Cowper, are the following appropriate lines:

Sweet bird! whom the winter contrains—
And seldom another it can—
To seek a retreat, while he reigns,
In the well-sheltered dwellings of man,
Who never can seem to intrude,
Tho' in all places equally free,
Come oft as the season is rude!
Thou art sure to be welcome to me.

The poet, having 'promised a feast at his windows,' and convinced of being 'paid with a song,' thus beautifully proceeds:

Then, soon as the swell of the buds
Bespeaks the renewal of spring,
Fly hence, if thou wilt, to the woods,
Or where it shall please thee, to sing:
And should'st thou, compelled by a frost,
Come again to my window or door,
Doubt not an affectionate host;
Only pay as thou pay'dst me before.

For the remainder of this translation, and the no less exquisite original, see Hayley's Life of Cowper, vol. iv, p. 367.

(*vespertilio*) appears; spiders shoot out their webs; the blackbird (*turdus merula*) whistles; and the skylark sings. The fieldfares, red-wings, skylarks, and titlarks, resort to watered meadows for food, and are, in part, supported by the gnats which are on the snow, near the water. Earth-worms lie out on the ground, and the shell-snail (*helix nemoralis*) appears. The chaffinch (*fringilla cælebs*) sings; jackdaws repair to the tops of churches; and the grey and white wagtail (*motacilla boarula* and *alba*) appear. Broods of these birds will flit round cows while feeding in moist pastures, approach their noses, and even go under their bellies in search of insects. Snipes, woodcocks, herons, wild ducks, and other waterfowl, retire from the frozen marshes to streams that are still open; and, as the cold strengthens, sea-birds come up the rivers in quest of food.

The famer exerts all his care in tending the domestic cattle. Cows can scarcely pick out any grass, and depend chiefly on hay for support: early lambs and calves are housed, and watched with almost paternal solicitude.

> Drooping, the labourer ox
> Stands covered o'er with snow, and then demands
> The fruit of all his toil.
> The bleating kind
> Eye the bleak heaven, and next the glistening earth,
> With looks of dumb despair; then sad, dispersed,
> Dig for the withered herb thro' heaps of snow.
> The foodless wilds
> Pour forth their brown inhabitants. The hare,
> Tho' timorous of heart, and hard beset
> By death in various form, dark snares, and dogs,
> And more unpitying men, the garden seeks,
> Urged on by fearless want.

Rabbits enter plantations, and commit great havoc by stripping trees of their bark. The sharp-eyed fox steals from the wood, and, rendered bold by famine, makes his incursions into the henroost and farmyard. The weasel and polecat also may be added to the number of the marauders. The cold-blooded ani-

mals, as the frog, snake, and lizard, are quite benumbed by the cold, and so remain till the approach of warm weather. The dormouse, marmot, &c. take their winter-sleep; while the squirrel and the field-mouse subsist, in their retreat, upon the provision which they have laid up during the autumn.

The flowers of the rosemary (*rosmarinus officinalis*) begin to open[1]. The winter aconite (*helleborus hiemalis*), and the bear's foot (*h. fœtidus*), are in flower about the middle of the month; the mezereon (*daphne m.*) 'breathes mild its early sweets;' and the red-dead-nettle (*lamium purpureum*) flowers under the shelter of southern hedges. The snowdrop (*galanthus nivalis*) seems on the point of blowing; the common creeping crowfoot (*ranunculus repens*) is in flower; and the crocus, if the weather be mild, appears above ground. Ivy casts its leaves; the catkin, or male blossom of the hazel (*corylus avellana*), unfolds; the flowers of the holly (*ilex aquifolium*) begin to open; and the leaves of the honeysuckle (*lonicera periclymenum*) are quite out. Towards the end of January, the daisy (*bellis perennis*) is in full bloom.

In this month, the farmer carries out manure to his fields, and repairs quickset hedges; taking advantage of the dry and hard ground, during frost. The barn resounds with the flail, barley being now thrashed for malting; he lops forest trees, and cuts timber for winter use.

> Forth goes the woodman, leaving, unconcerned,
> The cheerful haunts of man; to wield the axe,
> And drive the wedge, in yonder forest drear,
> From morn to eve his solitary task.
> Shaggy, and lean, and shrewd, with pointed ears,
> And tail cropped short, half lurcher and half cur,
> His dog attends him. Close behind his heel
> Now creeps he slow; and now, with many a frisk

[1] Kirke White has written a beautiful ode to the rosemary. See T.T. for 1814, p. 23.

Wide-scamp'ring, snatches up the drifted snow
With iv'ry teeth, or ploughs it with his snout;
Then shakes his powdered coat, and barks for joy.

About the end of the month, in dry weather, peas and beans are sown, and vetches for seed or fodder. Hogs are killed for bacon, and beef and hams are smoked.

Shooting is a favourite amusement at this season of the year; other sports, also, are resorted to, when the weather permits, particularly skating.

Of the uses of snow, we have before spoken at length[1]. It is a common opinion, that snow fertilizes the lands on which it falls more than rain, in consequence of the nitrous salts which it is supposed to acquire by freezing; this, however, is not the case: snow is chiefly useful as a covering, and in moistening and pulverizing the soil. Thomson falls into the popular error:

Thro' the blue serene,
For sight too fine, th' *etherial* NITER flies;
Killing infectious damps, and the spent air
Storing afresh with elemental life.

Dr. E. D. Clarke, in his Travels (vol. i, p. 11), records a very curious and beautiful phenomenon, which he witnessed before the breaking up of the winter season at St. Petersburgh. 'Snow, in the most regular and beautiful crystals, fell gently on our clothes, and on the sledge, as we were driving in the streets: all of them possessed exactly the same figure, and the same dimension. Every particle consisted of a wheel or star, with six equal rays bounded by circumferences of equal diameters: they had all of them the same number of rays branching from a common centre. The size of each of these little stars was equal to the circle presented by dividing a pea into two equal parts. This appearance continued during three hours, in which time no other snow fell, and there was sufficient leisure to examine them with the strictest atten-

[1] See T. T. for 1814, p. 19.

tion.' As water, in its crystallization (continues Dr. Clarke), seems to consist of radii diverging from a common centre, by the usual appearances on the surfaces of the ice, it might be possible to obtain the theory and ascertain the laws from which this stellar structure results. Monge, president of the French Institute, noticed, in falling snow, stars with six equal rays, which fell during winter, when the atmosphere was calm. This is also recorded by Haüy. Dr. Clarke has accompanied this description with three woodcuts, to which we refer the curious reader.

Ice-hills, and ice-palaces, have already been noticed[1]. As a supplement to the latter the reader may consult Cowper's beautiful description, in the 'Task,' book v, vss. 127-177. Ice-bridges are frequent in Germany. They are made, when a river is frozen over, by spreading straw on the ice, and watering it; and when that is frozen spreading more, till it can bear a waggon or almost any weight.

The lowest degree of cold, during the night, in England (latitude 53° 25') in January, 1814, was as follows; the observations were made from a self-registering thermometer, which was placed in an exposed situation to the south, about 15 feet from the earth.

Jan.	1	21½	
	3	20½	
	4	15	
	6	11	
	7		at ½ past 8 A.M. 12°
	8	9½	
	9	3	
	13	4½	
	14	16	at ½ past 8 A.M. 8°
	15	4	
	16	9	
	17	7	at 10 A.M. 10°
	20	13	
	22	14½	
	23	20	
	24	16	

[1] See T. T. for 1814, p. 25.

The cold, we believe, in former years has been more intense for a night or two, yet so long a continuance of very cold weather has seldom, if ever, been experienced in this climate. On January 16, during the night, the thermometer was down to zero; and it has been noticed by a scientific observer of the weather, that he has frequently seen Fahrenheit's thermometer at 20°; several times at 15°, more than once at 10°, once at 6°, and once so low as 2° below 0, viz. 34 degrees below the freezing point. This happened on Christmas day 1796, and is reputed to be the most intense degree of cold ever observed in England.

FEBRUARY.

SOME etymologists derive February from *Februa*, an epithet given to Juno, as the goddess of purification; while others attribute the origin of the name to *Februa*, a feast held by the Romans in this month, in behalf of the manes of the deceased. The Saxons named February, sprout-kele, on account of the sprouts of the cole-wort which began to appear in this month.

Remarkable Days.

2.—PURIFICATION OF THE BLESSED VIRGIN MARY.

THIS festival is of high antiquity, and the antient Christians observed it by using a great number of lights; in remembrance, as it is supposed, of our blessed Saviour's being declared by *Simeon*, to be a light to lighten the Gentiles. This practice continued in England till the second year of Edward the Sixth, when Archbishop Cranmer forbade it by order of the then privy-council. And hence the name of Candlemas Day. The Greeks call this festival Hypante, which signifies the *meeting*, because Simeon and

Anna met our Lord in the Temple on this day. The candles carried about on this day were *blessed* by the priests. It is little noted in Northumberland (observes Mr. Hutchinson), but by name.

Mr. Brand, in his observations on Bourne's XIX chap. from Bacon's Reliques of Rome, fo. 164, makes a quotation which informs us, that the Romans, in the service of their god Mars, and his mother Februa, made processions in the city of Rome with lighted torches; the remains of which custom still existing with the vulgar in the time of *Pope Sergius*, he commanded that it should be converted into an holy office of the Christian church, and that the congregation on the same day made their approach to the high altar with lighted tapers, in honour of the holy Virgin. Those who sigh for the sanctity of the church in such reviews of her ceremonies, must consider this was done to conciliate the minds of those long used in such spectacles and solemn shews; and that an austerity which should at once have abolished such acts, to which almost every mind was prejudiced, would have greatly retarded, if not totally prevented, the progress of conversion.'

This day is called 'Christ's Presentation,' 'the holiday of St. Simeon,' and, in the north of England, the 'Wives' Feast Day.' At Rippon, on the Sunday before Candlemas Day, the Collegiate Church is still one continued blaze of light all the afternoon, an immense number of candles being burnt before it.

8.—SAINT BLASE.

He was bishop of Sebaste in Armenia, and suffered martyrdom in 316, under the persecution of Licinius, by command of Agricolaus, governor of Cappadocia and the lesser Armenia. His festival is kept a holiday in the Greek church on the 11th of February. In the holy wars his relics were dispersed over the West, and his veneration was propagated by many miraculous cures, especially of sore throats. He is the principal patron of the commonwealth of Ragusa.

No other reason than the great devotion of the people to this celebrated martyr of the church, seems to have given occasion to the woolcombers to choose him the titular patron of their profession; and his festival is still kept by them at Norwich with a solemn guild. Perhaps the iron combs, with which he is said to have been tormented, gave rise to this choice.

5.—QUINQUAGESIMA SUNDAY. *See* SEPTUAGESIMA, p. 11.

5.—SAINT AGATHA.

'The cities of Palermo and Catana dispute the honour of her birth; but they do much better, who, by copying her virtues, strive to become her fellow-citizens in heaven.' (*Butler.*) She suffered martyrdom under Decius in the year 251. Agatha was honourably descended, and very beautiful. Her personal charms soon attracted the notice of Quintianus, prætor or governor of the province, who, being unable to accomplish his base designs, sent her to be imprisoned, for not worshipping the Pagan deities. Quintianus afterwards ordered her to be stretched on the rack; which torment was usually accompanied with stripes, the tearing of the sides with iron hooks, and burning them with torches. The brutal governor, enraged to see her suffer all this with cheerfulness, commanded her breasts to be tortured, and afterwards to be cut off. At which she made him this reproach: 'Cruel tyrant! do you not blush to torture this part of my body; you who sucked the breasts of a woman yourself?' He then remanded her to prison with a severe order, that neither medicine nor food should be allowed her. But God would be himself her physician, and sent the apostle St. Peter to comfort her, who healed all her wounds, and filled her dungeon with a heavenly light. Quintianus, not at all moved at the miraculous cure of her wounds, four days after caused her to be stript, and then rolled over live coals mixed with broken potsherds. Being carried back to prison she

made this prayer: 'Lord, my Creator, you have always protected me from the cradle. You have taken from me the love of the world, and given me patience to suffer: receive now my soul.' After which words she sweetly expired.—(*Butler abr.* vol. i, p. 158-9.)

7.—SHROVE TUESDAY.

This day is also called 'Fastern's Een' and Pancake Tuesday. *Shrove* is the preterite of *shrive*, an antiquated word which signifies to hear or make confession. On this day it was usual for the people to *confess*, that they might be the better prepared for the observation of the ensuing season of penitence, and for receiving the sacrament at Easter. It was afterwards converted into a day of idle sports and amusements; and within these few years, in many parts of England, its anniversary was distinguished by riot and drunkenness, by bull-baiting, cock-fighting, and such other diversions as were calculated to promote cruelty, inhumanity, and every thing the most opposite to the virtues which it was the intention of the church to teach and encourage. These barbarous customs, we fear, are not now wholly abolished.

The following account of cock-throwing is given by Mr. Brand, who says, 'I gathered the following particulars from a person who regretted that in his younger years he had often been a partaker of the sport. The owner of the cock trains his bird for some time before Shrove-Tuesday, and throws a stick at him himself, in order to prepare him for the fatal day, by accustoming him to watch the threatened danger, and, by springing aside, avoid the fatal blow. He holds the poor victim on the spot marked out, by a cord fixed to his leg, at the distance of nine or ten yards, so as to be out of the way of the stick himself. Another spot is marked, at the distance of twenty-two yards, for the person who throws to stand upon. He has three *shys*, or throws, for two pence, and wins the cock if he can knock him down, and run up and catch him before the bird recovers his legs. The in-

human pastime does not end with the cock's life, for when killed it is put into a hat, and won a second time by the person who can strike it out. Broomsticks are generally used to *shy* with. The cock, if well trained, eludes the blows of his cruel persecutors for a long time, and thereby clears to his master a considerable sum of money[1].' For some remarks on these barbarous practices, see T. T. for 1814, p. 36.

In Pasquin's Palinodia there is a minute description of Shrove-Tuesday sports:

" It was the day of all dayes in the yeare,
That unto Bacchus hath his dedication,
When mad-brained Prentices, that no men feare,
O'erthrow the dens of * * recreation;
When taylors, coblers, plaist'rers, smiths, and masons,
And every rogue will *beat down Barbers' basons*,
Whereat Don Constable in wrath appeares,
And runs away with his stout halbadiers.

" It was the day whereon both rich and poore
Are chiefly feasted with the self-same dish,
When every paunch, till it can hold no more,
Is fritter-filled, as well as heart can wish;
And every man and maide doe take their turne,
And tosse their pancakes up for feare they burne,
And all the kitchen doth with laughter sound,
To see the pancakes fall upon the ground.

" It was the day when every kitchen reekes,
And hungry people keepe a Jubile,
When flesh doth bid adieu for divers weekes,
And leaves old ling to be his deputie.

" It was the day when Pullen goe to block,
And every spit is filled.
When cocks are cudgeled down with many a knock,
And hens are thrasht to make them short and tender;
When country wenches play with stoole and ball,
And run at barly-breake untill they fall.[2]"

[1] Observations on Popular Antiquities, vol. i, p. 67, 4to ed. by Mr. Ellis.

[2] For a mass of curious particulars relative to this day, see Brand, as above quoted.

The custom of frying *pancakes* on this day is still retained in many families throughout the kingdom, but we think the practice not likely to last another century. In the *north*, the Monday preceding Shrove Tuesday is called *Collop Monday;* eggs and collops (slices of bacon) composing an usual dish at dinner on this day.

In the Romish church, it was particularly prescribed that all offences should be mutually forgiven, and reconciliation take place, before they entered upon the solemnities of Lent; and this was consequently a day of mutual intercourse and amity. *In several* antient Roman Catholic families the kitchen is opened, and every neighbour and passenger is permitted to enter and fry a pancake, for which the necessary provision is made ready. This seems to be derived from a custom in the refectory of religious houses, where the table was spread on this day for all pilgrims, travellers, and visitants. In Newcastle, Durham, and other places, the great bell of the church is tolled, the servants have holiday, and whoever partakes of the pancakes of the day must fry them; a circumstance which occasions high kitchen mirth. In the keeping of the vigils of all solemn days, the ceremony began at noon. The ringing of the great bell at noon was a signal to clear the larder of flesh meat, from which time its use was prohibited.—*(Hutchinson.)*

At Ludlow, there is a singular custom on this day. A rope of thirty-six yards long and three inches thick is provided at the expense of the chamberlain or chief constable, which at three o'clock in the afternoon is suspended at one of the market-house windows till the clock strikes four, when it is immediately thrown into the street by the chamberlain, and there seized by the hands of several hundred persons. On this occasion the inhabitants are divided into two parties, namely, *Castle* and *Broad Street* wards against those of *Old Street* and *Corve Street.*

A scene of great tumult continues till one of the parties has succeeded in pulling the rope to the extremity of one of the wards; after which, it is generally purchased of the victors, by subscription, and contended for a second and sometimes a third time.

It is said the practice of this uncouth and dangerous amusement was adopted by the corporation, in derision of the cruel and unjust condemnation and execution of two bailiffs of the town, by the royal party, at the time of the calamitous dispute between the houses of York and Lancaster.

The Popish Carnival commences from Twelfth-day, and usually holds till Lent. At Rome, the Carnival lasts for nine days, and it is no where seen in such perfection as at this place. Dr. Smith thus describes it: 'The equipages on the Corso (the principal street of the city) displayed great magnificence, and a fantastic style of ornament never indulged but in Carnival time. They were preceded by running-footmen, and attended by numerous servants in splendid liveries. The great variety of droll masks on foot were by far the most diverting part of the scene. Here were numbers of coarse athletic carmen dressed as women, fanning themselves with a pretended delicacy and listlessness highly comic, and hanging on the arms of their mistresses, whose little slender figures, strutting in breeches, made no less ridiculous an appearance. This kind of metamorphosis, on such an occasion, and in such a rank, is entertaining enough, though not, in my opinion, to be tolerated in any thing like regular society. A very common character in these masquerades is a man dressed like a quaker, who runs up to every body, making a sort of thrilling buzzing noise with his lips, and a very idiotic stare. We could not enter much into the humour of this personage; for he never spoke, nor made any other noise than the above. We fancied he was meant to burlesque our nation; for an Englishman is always so dressed

on the Italian stage, and especially as we sometimes saw these characters shaking one another violently by the hand, in the English manner caricatured. After the promenade had continued about two hours, the coaches were all drawn up in a row on each side of the street, and foot passengers either stationed between them and the houses, or seated on rows of chairs or benches on the foot-walk, which is in some parts raised three or four feet above the central pavement. A horse race now took place.

"We mixed with the *motley crowd* (continues Dr. Smith) every afternoon, our English clothes serving most completely as a masquerade dress, and procuring us a number of rencounters, all of the facetious and good-humoured kind. On the last day of the Carnival, all the diversions were carried to the highest pitch. The crowd was prodigious; but although every body was full of tricks, and all distinction of ranks and persons laid aside, the whole passed off without the least ill behaviour, or any thing like a quarrel. It was the most good-humoured mob I ever saw. About dusk every body took a small lighted taper in their hands, and most people held several; happy were they who could keep the greatest number lighted, for the amusement consisted in trying to extinguish each other's candles. Some people carried large flambeaux. All the windows, and even roofs, being crowded with spectators, and scarcely any body without lights, the street looked like a starry firmament. Below were many carriages parading up and down, much more whimsical and gaudy than had yet appeared. Some resembled triumphal cars, decked with wreaths of flowers and parti-coloured lamps in festoons. The company within carried tapers, and a plentiful ammunition of sugar plums, with which they pelted their acquaintances on each side, insomuch that the field of action looked next morning as if there had been a shower of snow. These carriages contained the first company and most elegant women in Rome, fantas-

tically dressed, but generally unmasked. They were open to the jokes and compliments of any body who chose to stand on the steps of their coach doors, which were very low, and the ladies were not backward in repartee. When they had no answer ready, a volley of sugar-plums generally repulsed their besiegers. The ranks on the raised footway, and the crowd below, were in a continual roar of laughter, some with effusions of real humour, while those who could sport no better wit bawled out, as they carried their branches of wax candles, "*Sia amazzato chi non ha lume*" (Kill all those that have no lights); to which the others answered, "Kill all those that have." Others called out, "*Siano amazzati gli abbati, barbieri, capucini,* or *mylordi,*" the latter to us Englishmen; and sometimes they called us *Francesi* (Frenchmen). A few fire-works were exhibited, but no very capital ones. On the whole, we were highly entertained with this grotesque amusement, and could not but admire the perfect good-nature of the people, who could carry off such a scene without the least disorder. Between eight and nine o'clock every body retired, and all was quiet[1].'

8.—ASH-WEDNESDAY.

Formerly Lent began on the Sunday after *Quinquagesima*, i. e. our first Sunday in Lent, and ended at Easter, containing in all 42 days; and subtracting the 6 Sundays which are not fasts, there remained only 36 fasting-days, the tenth part of 360, the number of days in the antient year, then considered as a tythe of the year consecrated to God's service. To these 36 fasting-days, however, of the *Old Lent*, Gregory added four days more, to render it equal to the time of our Saviour's fasting, causing it to begin on *Ash-Wednesday*, three days after *Quinquagesima*; and thus it has remained ever since. Lent is not of apostolic insti-

[1] Tour on the Continent, vol. ii, p. 50.

tion, nor was it known in the earlier ages of the Christian church.

The name only of this day remains, the peculiar customs are forgotten. Penitents expressed their humiliation by sackcloth and ashes. Fuller, in his Church Hist. p. 222, mentions a custom 'Of giving ashes on Ash-Wednesday, to put in remembrance every Christian man, in the beginning of Lent and penance, that he is but ashes and earth, and thereto shall return.' In the Protestant church the commination or service contains a public rehearsal of those curses which we find denounced in the scriptures, to which, with an impious arrogance, we add an amen (not with a petition for aversion); assuming a right of denunciation and judgment, when humiliation, contrition, and tears, would better befit the congregation in the rehearsal of the very curses by which most of them probably stand condemned.

For some remarkable fasts, and directions for 'keeping the true Lent,' see T.T. for 1814, p. 39.

14.—SAINT VALENTINE.

Valentine was an antient presbyter of the church: he suffered martyrdom in the persecution under Claudius II, at Rome. Being delivered into the custody of a man named Asterius, one of whose daughters was afflicted with blindness, he restored the use of her sight; and, by this miracle, converted the whole family to Christianity. They afterwards suffered martyrdom. Valentine, after a year's imprisonment at Rome, was beaten with clubs, and then beheaded, in the *Via Flaminia*, about the year 270.

The custom of choosing Valentines and of sending love-letters on this day, is discussed at length in T.T. for 1814, p. 32.

The first inventor of this custom (observes Mr. Hutchinson) must have been some benevolent female, who studied to encourage the intercourse of the sexes; for by such means intimacies might arise, productive of love and marriage engagements: or otherwise the

first design of those lots was, that those who shared in the dances, and diversions, might have their proper partners assigned, without hazarding the confusion and displeasure which must necessarily arise in the liberty of choice.

The facetious 'Poor Robin,' in his Almanack for 1757, says, 'Term is no sooner out, but in comes Valentine to trade in sweethearts. Then the maids look out sharp if possible to have him for a Valentine, whom they could inwardly incline to chuse for a husband; and as for those who are governed by lump love, if Valentine's day will not do for them, here is Pancake day a coming, one to please the fancy, and the other the appetite; for there are a great many bunch-clods in the world, that had rather have a belly full of victuals than a handsome sweetheart: not that I would encourage any body to neglect their victuals for the sake of a woman, much less to go to plays or masquerades to seek a handsome woman, where you have a better chance to meet with beauty than virtue.'

To the same author we owe the following lines, so characteristic of this day's pastimes:

This month bright Phœbus enters Pisces,
The maids will have good store of kisses;
For always, when the Sun comes there,
Valentine's Day is drawing near,
And both the men and maids inclina
To chuse them each a Valentine;
And if a man gets one he loves,
He gives her first a pair of gloves,
And by the way remember this,
To seal the favour with a kiss:
The kiss begets more love, and then
That love begets a kiss again,
Until this trade the man doth catch,
And then he does propose the match:
The woman's willing, tho' she's shy,
She gives the man this soft reply,
'I'll not resolve one thing or other,
Until I first consult my mother;'
When she says so, 'tis half a grant,
And may be taken for consent.

To compensate for the introduction of these homely lines, we will present our readers with some beautiful stanzas from the lyric muse of Mrs. Robinson:

No tales of love to you I send,
No hidden flame discover,
I glory in the name of friend,
Disclaiming that of lover.
And now, while each fond sighing youth
Repeats his vows of love and truth,
Attend to this advice of mine—
With caution choose a VALENTINE.

Heed not the fop, who loves himself,
Nor let the rake your love obtain;
Choose not the miser for his pelf,
The drunkard heed with cold disdain;
The profligate with caution shun,
His race of ruin soon is run:
To none of these your heart incline,
Nor choose from them a VALENTINE.

But should some generous youth appear,
Whose honest mind is void of art,
Who shall his Maker's laws revere,
And serve him with a willing heart;
Who owns fair Virtue for his guide,
Nor from her precepts turns aside;
To him at once your heart resign,
And bless your faithful VALENTINE.

Though in this wilderness below
You still imperfect bliss shall find,
Yet such a friend will share each woe,
And bid you be to Heaven resigned:
While Faith unfolds the radiant prize,
And Hope still points beyond the skies,
At life's dark storms you'll not repine,
But bless the day of VALENTINE[1].

15.—EMBER WEEK.

The Ember days are the Wednesday, Friday, and Saturday after the first Sunday in Lent, and after the 13th of December. It is enjoined by a canon of the church, 'that Deacons and Ministers be ordained, or

[1] See also T.T. for 1814, p. 33, *note*, for an elegant *jeu d'esprit* on this subject.

made, but only on the Sundays immediately following these Ember feasts.'—(*Nelson.*)

24.—SAINT MATTHIAS.

Matthias was, probably, one of the seventy disciples, and was a constant attendant upon our Lord, from the time of his baptism by St. John until his ascension. Upon the death of Judas, St. Peter recommended to the consideration of the Christians assembled at Jerusalem, the necessity of supplying this vacancy: and two were appointed; Joseph, called Barsabas, who was surnamed *Justus*, and Matthias. It was determined by lot in favour of the latter, who was accordingly numbered with the eleven apostles. Matthias employed the first years of his ministry in Judea; afterwards he travelled eastward, his residence being principally, according to St. Jerome, near the river Apsarus, and the haven Hyssus. Here he continued for some time, but was at last murdered by the barbarous natives. The gospel and traditions published under his name are considered spurious.

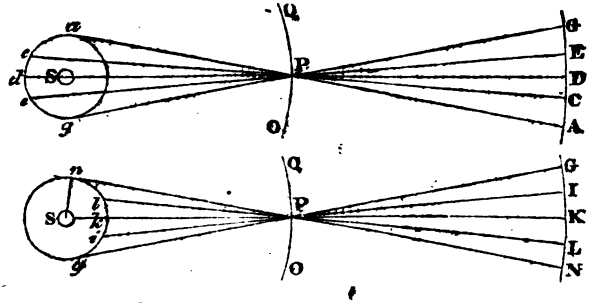
Astronomical Occurrences.

Of the Superior Planets.

THE apparent motion of a planet, if seen from the earth, is called its *Geocentric* motion; if seen from the Sun, it is denominated its *Heliocentric* motion.

The superior planets are Mars, Jupiter, Saturn, and the Herschel, besides the four smaller bodies which revolve between Mars and Jupiter, viz. Ceres, Pallas, Juno, and Vesta. Of these, and of the superior planets individually, we have given full accounts in *Time's Telescope* for 1814; we shall now show, by means of figures, under what circumstances they are sometimes in *conjunction* with the Sun, sometimes in *opposition*, and sometimes in *quadrature*.

Fig. 2 and 3.



Let S, *fig.* 2 and 3, be the Sun; QPO a part of the orbit of Jupiter; P the planet; *adg* or *nkg* the Earth's orbit. When the Earth is at *d*, the Sun at S, and the planet at P, the planet is in conjunction: when the Earth is at *k*, the Sun at S, and the planet at P, the planet is then in opposition: when the Earth is at *n* or *g*, and the planet at P, the planet will be in quadrature. It is evident, therefore, from the figure, that the superior planets move in orbits farther distant from the Sun than the orbit of the Earth.

I. The apparent diameter of a superior planet is greatest when the planet is in opposition; for then its distance from the Earth is less than it is when in conjunction, by the diameter of the Earth's orbit or 190,000,000 millions of miles. See the above *fig.*

II. The geocentric velocity of a superior planet is greatest at its conjunction and opposition. For arcs of a given length near the points *d* and *k*, when the planet is seen from the Earth in conjunction or opposition, would appear greater than arcs in any other part of the Earth's orbit, viewed from the planet P, because the former are seen directly, the latter obliquely: consequently these arcs would subtend greater angles, whence the apparent velocity of the planet, as viewed from the Earth, is greater at the conjunction or opposition than at any other time.

III. When a line drawn from a superior planet to the Earth is a tangent to the Earth's orbit, the planet appears stationary. While the Earth is at or near *a* or *g*, the points in its orbit lying in a line which, drawn from the planet, is a tangent to that orbit, the arc which it then describes so nearly coincides with the tangent line, that the Earth, for some time, seems to move directly from or towards the planet in a line of the tangent; whence the planet must, during that time, appear in that line, or to be stationary.

IV. When a superior planet is passing from one of its stationary situations to the other, through the conjunction, its geocentric motion is *direct;* but when it is passing through the opposition, it is *retrograde.* While the Earth is moving from *a* through *d* to *g*, the Sun and planet being both on the same side of the Earth, the motion of the Earth will produce an apparent motion in the Sun and planet the same way, and both will appear to move from A to G. But while the Earth moves from *g* to *n* through *k*, the Sun and planet being on contrary sides of the Earth, the motion of the Earth in its orbit will produce an apparent motion of the Sun and planet in contrary directions.

The progress, regress, and stations of the superior planets, will take place notwithstanding the motion of the Earth, since this only changes the place of the conjunctions and oppositions on which these depend; as was shown with respect to the inferior planets.

We may further observe with respect to the superior planets, that if any of them, as Saturn for instance, be seen from the Sun in conjunction with the Earth; after this, the Earth having a quicker motion than Saturn (the one going round the Sun in a year, while the other requires 30 years for the same journey), an inhabitant in the Sun will see the Earth daily recede more and more from Saturn. And since the Earth describes an arc in the ecliptic of 59 minutes and 8 seconds, and Saturn only 2 minutes in a day, the Earth will appear, from the Sun, to recede every day from

Saturn 57 minutes 8 seconds. Hence by common proportion, we say as 57 minutes 8 seconds : 360 degrees : : 1 day to a fourth quantity, which is 378, or the number of days in which the Earth will be observed again from the Sun, to be in conjunction with Saturn. When, however, the Earth and Saturn are seen, from the Sun, in conjunction, the Sun and Saturn, from the Earth, appear in opposition; therefore the time between two oppositions of the Sun and Saturn, computed generally, will be 378 days, or about 1 year and 13 days; the same takes place with regard to their conjunctions, elongations, &c. Of course, the time between conjunction and opposition will be half that time, or 189 days.

By the same method we find that the time between two conjunctions or oppositions of Jupiter and the Sun consists of about 398 days; for taking the exact period of Jupiter, and dividing the minutes in his orbit by 365, and it will be found that it moves at the rate of about 5 minutes a day; therefore we say as 59 minutes 8 seconds : 5 degrees, or as 54 minutes 8 seconds : 360 degrees : : 1 : a fourth quantity, equal to 398 or 399 days. The same sort of calculation will give the requisite results for Mars and the Herschel.

When the planets are in opposition to the Sun, they rise when the Sun sets, and set when he rises; after this they remain east of the Sun, and are seen after that luminary is below the horizon, till they come in conjunction, when they set and rise together. After this, as they recede from the Sun, they are to the west of the Sun, and are seen only the morning before the Sun rises.

It is evident that none of the superior planets can be seen from the Earth on the Sun's disk, as Venus and Mercury sometimes are, because they cannot be in a situation between the Earth and Sun: nevertheless they may any of them, and all are occasionally covered by the Sun, and lie in a line directly behind him, when they are in conjunction with him.

Since the faces of the planets which are turned to the Sun shine with the reflected light of the Sun, and since the Earth, seen from Jupiter or Saturn, is always observed near the Sun's body, the faces of the planets which are towards the Sun will also be towards the Earth, whence we always behold them shining in full orbs. But Mars having an orbit which lies near the Earth, its face which is towards the Sun will not always be turned towards the Earth: for when he is in or near his quadrature, or when there is about the fourth part of the ecliptic between the Sun and him, as suppose the Earth in M or B, and Mars in N or R, then some part of the illuminated face will be turned from the Earth, and therefore Mars will not appear in a complete circle, but will be gibbous; but when he comes to be in conjunction or opposition, at *x* or *z*, when the Earth is at M or B, he then assumes his round figure, his illuminated face being totally turned towards the Earth. In opposition at *x*, when the Earth is at M, he looks the largest and most brilliant, being then about five times nearer to the Earth than he is when at *z*, or in conjunction with the Sun. [See the *fig.*]

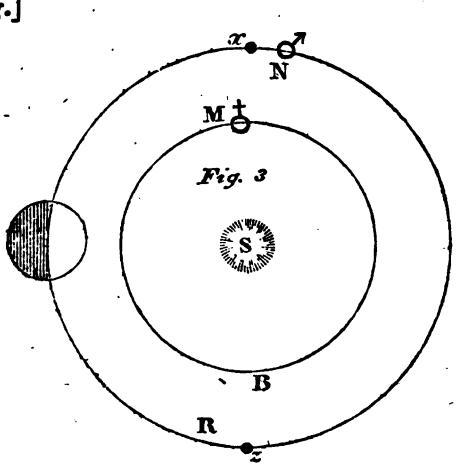


Fig. 3

Since Jupiter is five times farther from the Sun than the Earth is, the apparent diameter of the Sun, seen from Jupiter, will be five times less than it is seen from the Earth, and the whole disk of the Sun will appear 25 times less to the inhabitants of Jupiter than it does to us. Saturn being 10 times farther from the Sun than the Earth, the diameter of the Sun to an inhabitant of that planet will appear 10 times less, and his disk 100 times less than they do to us; of course, its light and heat are diminished in the same proportion; therefore the warmest regions in Saturn are colder than our coldest.—For more on these subjects, see Time's Telescope for 1814.

Table of the Sun's Rising and Setting every 10th Day:

Wednesday	2d,	Sun rises 7 h. 28 m.	Sun sets 4 h. 32 m.
Saturday	11th,	- - - - 7 h. 10 m.	- - - - 4 h. 50 m.
Tuesday	21st,	- - - - 6 h. 51 m.	- - - - 5 h. 9 m.

Table of the Equation of Time. [See January.]

			m.	*s.*
Wednesday	1st,	*to* the time marked on the dial *add*	13	53
Monday	6th,	- - - - -	14	25
Saturday	11th,	- - - - -	14	36
Thursday	16th,	- - - - -	14	28
Tuesday	21st,	- - - - -	14	1
Sunday	26th,	- - - - -	13	18

The Sun enters the sign Pisces at 7 m. past 11 on the 19th.

The Moon will be at change, or new Moon, on the 9th day, at 31 m. past 9 in the morning: it enters its first quarter on the 17th, at 44 m. past 4 in the morning; and it is full at 16 m. past 8 in the evening.

The Moon may be seen on the *meridian* on the

2d day, at 34 m. past 6 in the morning.
3d, - - 21 - - 7
16th, - - 23 - - 5 in the evening.
20th, - - 13 - - 9
23d, - - 15 - - 12

Table of the Eclipses of Jupiter's first Satellite.

6th,	-	- 37 m.	after	5	in the morning.
7th,	-	- 5	-	-	midnight.
15th,	-	- 59	-	-	1 in the morning.
22d,	-	- 52	-	-	3
23d,	-	- 21	-	-	10 in the evening.
29th,	-	- 46	-	-	5

HISTORY OF ASTRONOMY.

[Continued from p. 27.]

Thales, of Miletus, who flourished about 640 years before the Christian æra, seems to have been the first of the Greeks who made any discoveries in astronomy. Being descended from the kings of Phœnicia, this philosopher spent a great part of his life with the Egyptian priests, who instructed him in the sciences with which they were conversant: and during his residence in Egypt he taught them some departments of knowledge of which they were ignorant; among others, how to determine the heights of the pyramids by the shadows which they projected. When Thales returned to his native country, he established the Ionian school, and instructed his disciples in the knowledge which he had collected. He maintained, to the astonishment of his contemporaries, that the stars were of the same substance as that of the Earth; that the Moon borrowed her light from the Sun; that the eclipses of the Moon were occasioned by her immersion into the Earth's shadow: that the Earth was spherical, and that it was divided into five zones by the polar circles and the tropics, and that the equinoctial line was cut obliquely by the ecliptic, and perpendicularly by an imaginary line denominated the meridian. By means of the Egyptian periods already noticed, or by some rules which he learnt from the Egyptians, Thales predicted an eclipse of the Sun: the accomplishment

of this prediction gave him a distinguished place among his countrymen, and drew around him a great number of disciples.

Thales left a disciple, Anaximander, who was born about 610 B.C., and followed the career of his preceptor. As far as can now be ascertained, he was the first who viewed the heavens with the eye of a philosopher. Hitherto the science of astronomy consisted only of a number of rude and ill-digested observations, inaccurate rules and opinions that could not be depended upon. 'The mind,' says the historian, 'had not yet risen to general views, nor attempted to combine, in its comprehensive grasp, the loose materials which had been accumulated for ages.' Guided by analogy, Anaximander regarded the planets as unconnected with the benefits they were supposed to confer on this little globe which we inhabit. He taught, that they were peopled by animated beings, and that the fixed stars were centres of other systems, perhaps more extensive and glorious than our own. He considered the Sun as a body of fire, and he taught his disciples that the Earth moved round this body as the centre of the world. These attempts at theory were sufficient to immortalize the man whose genius could comprehend or invent them. This illustrious philosopher erected at Lacedæmon a gnomon, with which he made his celestial observations, and he is said to have been the inventor of geographical charts.

Anaxagoras, the next considerable astronomer in Greece, was born about the year 500 B.C., and having been instructed in the principles of philosophy by Anaximenes (who did not himself add much to what had been taught by Anaximander), was so much attached to astronomical researches, that he abandoned the private concerns of life, and likewise refusing to mingle in the bustle of public life, set himself to the contemplation of the stars, which he considered as the natural destiny of man. About the

year 464 B.C., a meteoric stone fell near the river Egos, a circumstance which induced Anaxagoras to believe that the superior regions were filled with fire, from which the stars were formed. He, however, regarded the Sun as an immense body of fire, or an inflamed stone larger than the Peloponnesus. He ascribed the whiteness of the milky way to the native light of some stars. He regarded the comets as formed of a number of wandering stars. He was the first who wrote on the phases and eclipses of the Moon; and he taught that the Moon was a place of habitation to animated beings, and that it contained seas, mountains, and valleys, like our own earth.

The attempts of this philosopher to explain, by natural causes, the phenomena of the heavens, were regarded by his countrymen as intended to subvert the established religion, and he, with his whole family, was banished as an enemy to the gods. The philosopher, indeed, was sentenced to a cruel death, but, by the interposition of his friend and disciple Pericles, the heavy sentence was commuted into banishment for life. While the Ionian school, which Anaxagoras and others had transported from Miletus to Athens, was enlightening that renowned seat of philosophy, the science of astronomy was making rapid advances in Italy under Pythagoras. This great philosopher, having been first instructed by Thales, travelled in search of knowledge in Phœnicia, Chaldea, and India. From these countries he went into Egypt, and, after he had resided there several years, he returned to Samos, loaded with intellectual spoils, and instructed in all the mysteries of the East. The inhabitants of Samos rejected the knowledge which Pythagoras had previously offered them, and thus compelled him to seek in Italy for more grateful and willing disciples. He improved upon the doctrines taught in the Ionian school: he demonstrated, from the different altitudes of the stars at different places, that the Earth was round; and

he allowed that there might be antipodes in the opposite part of the globe. He considered the planet Venus as a morning and evening star (see Astron. Occur. for January), and he conceived the universe to be composed of twelve different spheres, viz. the sphere of the fixed stars—of Saturn—of Jupiter—of Mars—of Mercury—of Venus—of the Sun—and of the Moon: and that these were again succeeded by the spheres of fire, air, water, and the terrestrial globe. The plurality of worlds, suggested by Anaxagoras, was fully believed by Pythagoras, who went so far as to calculate the size of the supposed Lunar animals. Pythagoras taught the harmony of the spheres, that is, he imagined that the solid spheres in which the planets were fixed, ought, during their respective revolutions, to emit sounds proportional to their mutual distances; but that this celestial concert, though loud and grand beyond all human conception, was not audible to the feeble and imperfect organs of human beings. The most distinguishing tenet of the Pythagorean school, was the diurnal revolution of the Earth, and its annual motion round the Sun, which they supposed to occupy the centre of the planetary system. The fate of Anaxagoras probably warned Pythagoras of the danger to which he would be exposed by teaching it in public, and hence he was obliged to communicate it to his disciples under the seal of mystery, while he flattered the prejudices of his countrymen by maintaining, in public, the immobility of the Earth. The motion of the planets round the Sun seems to have suggested to Pythagoras the opinion that the comets, like planets, revolved about the central luminary. Pythagoras flourished in the sixth century before the birth of Christ.

The true system of the universe, in which Pythagoras believed, and which he taught, as it were by stealth, was publicly maintained by his disciple Phi-

Iolaus, who flourished about the year 450 B.C.; but he soon found the danger of controverting the common prejudices of mankind, and was obliged to seek that protection in a foreign land which his own country denied him.

This period was distinguished by a number of astronomers, of whom Seleucus, of Erithea, maintained that the Earth turned round, like the circumference of a wheel; and Nicetas, of Syracuse, taught, that the stars were at rest, and that their apparent motion arose from the diurnal rotation of the Earth. Cleostratus, of Cnidos, proposed a luni-solar period of eight years, consisting of 365¼ days each, and that an intercalary lunar month should be added at the end of the third, the fifth, and the eighth years: this, however, produced a small error at the end of the period. Some other attempts were made, at this time, to reform the calendar; but it was reserved for the celebrated Meton, assisted by his friend Euctemon, to accomplish this object. He proposed, for this purpose, a cycle of nineteen solar years, or 235 lunations, which was equal to nineteen lunar years, and seven intercalary months, which were to be introduced on the third, sixth, eighth, eleventh, fourteenth, seventeenth, and nineteenth years of the cycle; and instead of making the lunar months consist alternately of twenty-nine and thirty days, he proposed that 110 months should contain twenty-nine days each, while the remaining 125 were to contain thirty days each. By this contrivance, the motions of the Sun and Moon were nearly reconciled, and the Metonic cycle began to be used on the 16th of July, A.C. 433. Without attempting to pursue all the theories advanced at or about this period, we may observe that Parmenides explained the stability of the Earth, by saying, that no reason could be assigned why it should fall to one side rather than the other, and thus anticipated what has been denominated the

sufficiens causa of Archimedes, and of the more modern philosopher Leibnitz. Democritus, of Abdera, advanced the same explanation of the whiteness of the milky way that Dr. Herschel has actually discovered by his powerful telescopes, by means of which he has, as it were, separated that immense nebula into its component stars:—and he maintained, that the number of the planets was not known, and that more would be discovered in succeeding ages. This prediction, which was the result rather of conjecture than sound principles, has however been accomplished after an interval of more than 2000 years.

[To be continued.]

The Naturalist's Diary.

The verdure of the plain lies buried deep
Beneath the dazzling deluge; and the bents
And coarser grass, upspearing o'er the rest,
Of late unsightly and unseen, now shine
Conspicuous, and in bright apparel clad,
And fledged with icy feathers, nod superb.

THE month of February, although generally considered cold, gloomy, and comfortless, like its precursor, points out to the naturalist many an object of curiosity. The grass is frequently spangled with ten thousand frozen dewdrops, which, as the sun darts his slant beams against them, give, by their varied reflections, all the colours of the rainbow; and represent nothing less upon the green floor, than a pavement covered with brilliants. The ice on the edges of small ponds, if examined by a microscope, will afford abundant matter for admiration to the attentive observer of nature. It will be found to contain numerous animalcules whose minute and delicate frames remain uninjured in the rock of adamant in which they are imbedded.

No product of nature is unpeopled by others of its creatures, even under the most disadvantageous circumstances. Water-plants, by the sides of rivers covered with ice, abound with animalcules. Neither the part of these frozen vegetables that is above, nor that which is under the surface of the ice, is destitute of its inhabitants; neither that part which is frozen by the air, nor that which is drenched in water, is vacant. Creatures of different forms and natures, indeed, appear on the different parts; but even these are not wholly unconnected with one another in the great chain of beings. The subaqueous inhabitants are mere reptiles, but those which occupy the drier part are of the winged tribe.

Is it no pleasure, when prevailing frost
Has hardened earth's dank surface, and the frost
Treads upon rock, where erst it sank absorbed—
Is it no pleasure ———
To mark the wonders of the frozen world?
——— the merest speck
Of animated matter, to the eye
That studiously surveys the wide design,
Is a full volume of abundant art.
If to the spot invisible we strain
Our aching sight, and with microptic tube
Bring it at last within our feeble ken,
What wonders owns it not[1]!

[1] The microscope discovers legions of animalcules in most liquids, as water, wine, vinegar, beer, dew, rain-water, chalybeate waters, and in infusions of pepper, bay-berries, oats, barley, wheat, &c. The whole earth is replenished with an inexhaustible store of what we should least of all suspect—an infinite number of animalcules floating in the air we breathe, sporting in the fluids we drink, or adhering to the several objects which we see and handle.

Far less than mites, on mites they prey;
Minutest things may swarms contain:
When o'er your ivory teeth they stray,
Then throb your little nerves with pain.

Fluids, in drops, minutely swell;
These subtile beings each contains;
In the small sanguine globes they dwell,
Roll from the heart, and trace the veins.

In the course of this month all nature begins, as it were, to prepare for its revivification. About the 4th or 5th, the woodlark (*alauda arborea*), one of our earliest and sweetest songsters, renews his note; a week after, rooks begin to pair, and geese (*anas, anser*) to lay; the thrush and the chaffinch sing; turkey-cocks strut and gobble; the yellow hammer (*emberiza citrinella*) sings; and the green woodpecker (*picus viridis*) makes a loud noise.

The woodpecker receives his name from the facility with which he picks the insects from the chinks of trees, and holes in the bark. They are often seen hanging by their claws, and resting upon their tails against the stem of a tree; and after darting, with strength and noise, their beak against the bark, turn round with great alacrity, which manœuvre has made the country people suppose that they go round to see whether they have not pierced the tree through its body. The fact is, that this beating against the bark is for no other purpose than to rouse the insects which the chink contains, and to force them to come out, which they would not do if their enemy was present there; and soon after the pecker, turning round, takes them unawares, and feeds upon them: when the insects answer not the delusive call, the birds dart their long tongues into the hole, and bring out, by this means, their reluctant prey. The plumage of this bird is a compound of red and green, two colours, the approximation of which is always productive of harmony in the works of nature. They nest in the hollow of trees, where the female lays five or six whitish eggs upon the bare ground, trusting to the natural heat of her body to hatch them into life.

Through every tender tube they rove,
In finer spirits strike the brain;
Wind quick through every fibrous grove,
And seek, through pores, the heart again.

SAVAGE.

The *redbreast* warbles still, but is content
With slender notes, and more than half suppressed;
Pleased with his solitude, and flitting light
From spray to spray, where'er he rests, he shakes
From many a twig the pendant drops of ice,
That tinkle in the withered leaves below[1].

Towards the middle of the month, partridges (*tetrao perdix*) begin to pair; the house pigeon has young; field crickets open their holes; missel thrushes couple; and wood owls hoot:—gnats play about, and insects swarm under sunny hedges; frogs (*rana temporaria*) croak, and the stone curlew (*otis œdicnemus*) clamours. By the latter end of this month, the raven (*corvus corax*) has generally laid its eggs, and begun to sit. Moles (*talpa europæus*) commence their subterraneous operations.—The habitation where moles deposit their young merits a particular description; because it is constructed with peculiar intelligence, and because the mole is an animal with which we are well acquainted. They begin by raising the earth, and forming a pretty high arch. They leave partitions, or a kind of pillars, at certain distances, beat and press the earth, interweave it with the roots of plants, and render it so hard and solid, that the water cannot penetrate the vault, on account of its convexity and firmness. They then elevate a little hillock under the principal arch; upon the latter they

To the REDBREAST.

[1] When that the fields put on their gay attire,
Thou silent sit'st near brake or river's brim,
Whilst the gay thrush sings loud from covert dim;
But when pale winter lights the social fire,
And meads with slime are sprent, and ways with mire,
Thou charm'st us with thy soft and solemn hymn
From battlement, or barn, or haystack trim;
And now not seldom tun'st, as if for hire,
Thy thrilling pipe to me, waiting to catch
The pittance due to thy well-warbled song:
Sweet bird! sing on; for oft near lonely hatch,
Like thee, myself have pleased the rustic throng,
And oft for entrance, 'neath the peaceful thatch,
Full many a tale have told, and ditty long.

ORAM.

lay herbs and leaves for a bed to their young. In this situation they are above the level of the ground, and, of course, beyond the reach of ordinary inundations. They are, at the same time, defended from the rains by the large vault that covers the internal one, upon the convexity of which last they rest along with their young. This internal hillock is pierced on all sides with sloping holes, which descend still lower, and serve as subterraneous passages for the mother to go in quest of food for herself and her offspring. These by-paths are beaten and firm, extend about twelve or fifteen spaces, and issue from the principal mansion like rays from a centre. Under the superior vault we likewise find remains of the roots of the meadow saffron, which seem to be the first food given to the young. From this description it appears, that the mole never comes abroad but at considerable distances from her habitation. Moles, like the beavers, pair; and so lively and reciprocal an attachment subsists between them, that they seem to disrelish all other society. In their dark abodes they enjoy the placid habits of repose and solitude, the art of securing themselves from injury, of almost instantaneously making an asylum or habitation, and of procuring a plentiful subsistence without the necessity of going abroad. They shut up the entrance of their retreats, and seldom leave them, unless compelled by the admission of water, or when their mansions are demolished by art.

The flowers of the crocus (*crocus vernus*) appear before the leaves are grown to their full length. The barren strawberry (*fragraria sterilis*); the laurustinus (*viburnum tinus*); and the yew-tree (*taxus baccata*), are in flower. The elder-tree (*sambucus nigra*) begins to put forth its flower buds, and the catkins of the hazel are very conspicuous in the hedges. The gooseberry bush (*ribes grossularia*) and the red currant (*ribes rubrum*) show their young leaves about the end of the month. Many plants appear above ground in February, but few flowers, except the snowdrop, are to be found:

this 'morning star of flowers' is sometimes fully opened from the beginning of the month.

> Already now the snowdrop dares appear,
> The first pale blossom of th' unripened year;
> As Flora's breath, by some transforming pow'r,
> Had changed an icicle into a flower:
> Its name and hue the scentless plant retains,
> And winter lingers in its icy veins.
> To these succeed the violet's dusky blue,
> And each inferior flower of fainter hue;
> Till riper months the perfect year disclose,
> And Flora cries, exulting, 'See my rose.'

The husbandman is now eager to commence the work of ploughing; which important business is finished in this month, if the weather permit;—early potatoes are set, hedges repaired, trees lopped, and wet lands drained. Poplars, willows, osiers, and other aquatics, are planted.

To those who are unaccustomed to the various changes produced by the influence of intense frost, nothing can appear more wonderful than the winter market at St. Petersburgh. The astonished sight is there arrested by a vast open square, containing the bodies of many thousand animals, piled in pyramidical heaps, on all sides; cows, sheep, hogs, fowls, butter, eggs, fish, all stiffened into granite.

The fish are attractively beautiful, possessing the vividness of their living colour, with the transparent clearness of wax imitations. The beasts present a far less pleasing spectacle, most of the larger sort being skinned, and classed according to their species: groupes of many hundreds are seen piled upon their hind legs against one another, as if each were making an effort to climb over the back of its neighbour. The motionless yet apparent animation of their seemingly struggling attitudes (as if suddenly seized in moving, and petrified by frost) gives a horrid life to this dead scene. Had an enchanter's wand been instantaneously waved over this sea of animals during their different actions, they could not have been fixed

more decidedly. Their hardness, too, is so extreme, that the natives chop them up for the purchasers like wood. All the provisions which remain, on the commencement of a thaw, immediately putrefy; but as the duration of the frost is generally calculated to a day, but little loss is suffered in this respect.

A curious circumstance occurred at Stockholm in the winter of 1799. A sugar house taking fire, a number of engines immediately hurried to the spot. But the water being frozen to the depth of a yard in every place near the street, it was necessary to break the ice with hatchets and hammers. The water, when procured, was continually stirred, to prevent it from freezing. On the upper stories of this building was deposited a large stock of sugar, and many vessels full of treacle, which being broken by the falling in of the roof, the juice ran down along the sides of the walls. The water thrown up to the top of the house by the engines, and flowing back on the walls, staircases, and through the windows, was stopped in its downward course by the mighty power of the frost. After the fire was extinguished, the engines continued for some time to play, and the water they discharged was frozen almost the very instant it came in contact with the walls already covered with ice. Thus a house was formed of the most extraordinary appearance that it is possible to conceive. It was so curious an object, that every body came to gaze at it as a something wonderful. The whole building, from top to bottom, was incrusted with a thick coat of ice; the doors and windows were closed up, and in order to gain admission it was necessary with hammers and hatchets to open a passage; they were obliged to cut through the ice another staircase, for the purpose of ascending to the upper stories.

All the rooms, and what remained of the roof, were embellished by long stalactites of multifarious shapes, and of a yellowish colour, composed of the treacle and congealed water. This building, contem-

plated in the light of the sun, seemed to bear some analogy to those diamond castles that are raised by the imaginations of poets. It remained upwards of two months in the same state, and was visited by all the curious. The children in particular had excellent amusement with it, and contributed not a little to the destruction of the enchanted palace, by searching for the particles of sugar, which were found in many places incorporated with the ice[1].

Ambrose Phillips, in his letter to the Earl of Dorset, from Copenhagen, has given us an accurate description of some of the picturesque beauties of a northern winter:

> Here ev'ry shrub and ev'ry blade of grass,
> And ev'ry pointed thorn, seemed wrought in glass.
> In pearls and rubies rich the hawthorns show,
> While thro' the ice the crimson berries glow.
> The thick-sprung reeds which wat'ry marshes yield
> Seemed polished lancets in a hostile field.
> The stag in limpid current with surprise
> Sees crystal branches on his forehead rise.
> The spreading oak, the beech, and tow'ring pine,
> Glazed over, in the freezing ether shine;
> The frighted birds the rattling branches shun,
> Which wave and glitter in the distant sun.

In Sweden, if travellers happen to pass by while the peasants of any hamlet, or little village, are in the bath, and their assistance is needed, they will leave the bath, and assist in yoking and unyoking, and fetching provender for the horses, or in any thing else, without any sort of covering whatever, while the passenger sits shivering with cold, though wrapped up in a good sound wolf's skin. There is nothing more wonderful than the extremities which man is capable of enduring through the power of habit.

The Finnish peasants pass thus instantaneously from an atmosphere of 70 degrees of heat to one of 30 degrees of cold, a transition of 100 degrees, which is the same thing as going out of boiling into

[1] See Acerbi's Travels in Sweden.

freezing water! and what is more astonishing, without the least inconvenience; while other people are very sensibly affected by a variation of but five degrees, and in danger of being afflicted with rheumatism by the most trifling wind that blows. These peasants assure you, that without the hot vapour baths they could not sustain as they do, during the whole day, their various labours. By the bath, they say that their strength is recruited as much as by rest and sleep. The heat of the vapour mollifies to such a degree their skin, that the men easily shave themselves with wretched razors, and without soap. Had *the immortal* SHAKSPEARE known of a people who could thus have pleasure in such quick transition from excessive heat to the severest cold, his *knowledge* might have been increased, but his *creative fancy* could not have been assisted :—

> Oh! who can hold a fire in his hand,
> By thinking of the frosty Caucasus?
> Or wallow naked in December snow,
> By thinking on fantastic summer's heat?

MARCH.

AMONG the Romans, March, from Mars, was the first month, and marriages made in this month were accounted unhappy. The Saxons called March *lent-monat*, or *length-month*, 'because the days did first begin, in length, to exceed the nights.'

Remarkable Days.

1.—SAINT DAVID.

SAINT David was the great ornament and pattern of his age. He spoke with much force and energy, but his example was more powerful than his eloquence; and he has in all succeeding ages been the glory of the British church. He continued in the see of St. David's many years; and having founded several monasteries, and been the spiritual father of many saints

both British and Irish, he died about the year 544, at a very advanced age. He was buried in the church of Saint Andrew, which, with the town and whole diocess, are named after him. Near the church stand several chapels, formerly resorted to with great devotion: the principal is that of St. Nun, mother of St. David, near which is a beautiful well still frequented by pilgrims. Another chapel is sacred to St. Lily, surnamed Gwas-Dafydd, that is, St. David's man; for he was his beloved disciple and companion in his retirement. He is honoured there on the 3d, and St. Nun, who lived and died the spiritual mother of many religious women, on the 2d of March. The three first days of March were formerly holidays in South Wales in honour of these three saints; at present only the first is kept a festival throughout the principality.

In the wild and romantic scenery of Llanthony, at the foot of the black mountains, on the banks of the Honddy, in the sequestered vale of Ewias, St. David formed a hermitage and erected a chapel:—

A little lowly hermitage it was
Down in a dale, hard by a forest's side,
Far from resort of people, that did pass
In travell to and fro: a little wyde
There was an holy chapell edifyde,
Wherein the hermit dewly wont to say
His holy things each morn and eventyde;
Thereby a christall streame did gently play,
Which from a sacred fountain welled forth alway.

So retired is this spot, that, at one time, it was scarcely known to the neighbouring hamlets. Walter de Lacy, one day in pursuit of a deer, discovered those mysterious erections, and being struck with the solemnity of the spot, he was visited by religious enthusiasm;—he disclaimed the world, and erected the abbey of Llanthony for the use of the Cistercian order[1].

[1] See that elegant and interesting work 'The *Philosophy of Nature*,' vol. ii, p. 133.

The leek worn on this day by Welshmen is said to be in memory of a great victory obtained by them over the Saxons; they, during the battle, having leeks in their hats, to distinguish themselves, by order of St. David. Another account adds, that they were fighting under their King Cadwallo, near a field that was replenished with that vegetable.

From some lines in 'Poor Robin's Almanack' for March 1757, it would seem that the *Saxons* were not *then* very much attached to their British neighbours, for we have the following ludicrous description of burning St. David in effigy,—a counterpart of the mummery still practised on the 5th of November.

The first of this month some do keep,
For honest Taff to wear his leek;
Who patron was, they say, of Wales,
And since that time, cuts-plutter-a nails,
Along the street this day doth strut
With hur green leek stuck in hur hat,
And if hur meet a shentleman
Salutes in Welsh; and if hur can
Discourse in Welsh, then hur shall be
Amongst the green-horned Taffy's free.
But it would make a stranger laugh
To see th' English hang poor Taff;
A pair of breeches and a coat,
Hat, shoes and stockings, and what not;
All stuffed with hay to represent
The Cambrian hero thereby meant;
With sword sometimes three inches broad,
And other armour made of wood,
They drag hur to some publick tree,
And hang hur up in effigy.

St. David and the leek are again sneered at in the almanack for March 1759.

2.—SAINT CHAD.

St. *Ceadda* or Chad was educated in the monastery of Lindisfarne, under St. Aidan. To improve himself in sacred literature he went into Ireland, and spent some time with St. Egbert, till recalled by his brother, St. Cedd, to assist him in arranging the concerns of the monastery of Lestingay, which he had

founded in the mountains of the *Deiri*, or Wolds of Yorkshire. St. Cedd being made bishop of London or of the East Saxons, left to him the entire government of this house. Oswi having yielded up Bernicia, or the northern part of his kingdom, to his son Alefrid, this prince sent St. Wilfrid into France, that he might be consecrated to the bishopric of the Northumbrian kingdom, or of York; but he staid so long abroad, that Oswi himself nominated St. Chad to that dignity, who was ordained by Wini, Bishop of Winchester, assisted by two British prelates, in 666. Bede assures us that he zealously devoted himself to all the laborious functions of his charge, visiting his diocess on foot, preaching the gospel, and seeking out the poorest and most abandoned persons to instruct and comfort, in the meanest cottages and in the fields.

Our saint afterwards left the see of York, and retired to the monastery of Lestingay, but was not suffered to bury himself long in that solitude. Jaruman, bishop of the Mercians, dying, St. Chad was called upon to take upon him the charge of that most extensive diocess. He was the fifth bishop of the Mercians, and first fixed that see at Lichfield, so called from a great number of martyrs slain and buried there under Maximianus Herculeus; the name signifying the Field of Carcases. Hence this city bears for its arms a landscape covered with the bodies of martyrs. St. Theodorus considering St. Chad's old age, and the great extent of his diocess, absolutely forbade him to make his visitations on foot, as he used to do at York. St. Chad remained in the diocess of Lichfield for two years and a half, dying in the great pestilence in 672.

St. Chad was buried in St. Mary's church, in Lichfield, but afterwards his bones were translated to the church of St. Peter; in both which places, in testimony of his sanctity, 'frequent miraculous cures,' says St. Bede, 'are wont to be wrought:

amongst the rest of late, says he, a certain distracted person, wandering about, arrived there in the evening unknown, or unregarded by the keepers of the place; and having rested there all the night, came out the next morning in his perfect senses, to the great admiration and joy of all. The place of the sepulchre, continues the historian, is a wooden monument, made like a little house covered; having a hole in the wall, through which those that go thither for devotion usually put in their hand, and take out some of the dust; which being put into water, and given to sick cattle or men to drink, gives present ease to their infirmity, and restores them to health.'

The relicks of St. Chad were afterwards translated to the church built by Roger de Clinton, anno 1148, and dedicated to God in honour of the Blessed Virgin, and of St. Chad; which is now the cathedral of Lichfield.

5.—MIDLENT SUNDAY.

The middle or fourth Sunday in Lent was formerly called the Sunday of the five Loaves, the Sunday of Bread, and the Sunday of Refreshment, in allusion to the gospel appointed for this day. It was also named *Rose-Sunday*, from the pope's carrying a *golden rose* in his hand, which he exhibited to the people in the streets as he went to celebrate the eucharist, and at his return. *Mothering Sunday* is another name attached to this day, from the practice, in Roman Catholic times, of people visiting their *mother-church* on Midlent Sunday. Hence, perhaps, the custom now existing in some parts of England, of children visiting their parents, and presenting them with money, trinkets, or some other trifle. Furmety is commonly a rural repast on this day. It is made of whole grains of wheat first parboiled, and then put into and boiled in milk, sweetened and seasoned with spices.

March the 6th is, sometimes, the Jewish Festival

of *Purim* or *Lots*, commonly called the Hanging of Haman: the whole history of the origin of this observance, and that of Haman, is amply detailed in the book of Esther, who, after showing himself as the implacable enemy of the Jews, was hanged with his ten sons. It was afterwards agreed that the memory of this signal deliverance should be celebrated for ever on two successive days, the first of which is called *Purim*, and the second *Shushem Purim*. But, previously to these, on the 5th day of March, the Fast of Esther is observed, on the evening of which the whole *Meguillah*, or book of Esther, is read, and again repeated in the morning. The two last days are generally spent in rejoicing, and, what should never be omitted, charitable gifts to the poor. —Christians repair to the synagogues to hear the boys knock against the pews, &c. with wooden hammers; called knocking down Haman.

7.—PERPETUA.

Perpetua, a noble lady of Carthage, only 22 years of age, suffered martyrdom in 203, by order of Minutius Firmianus, under the persecution of the Emperor Severus. In the amphitheatre, Perpetua was exposed to the attacks of a wild cow, and, after being much gored by this animal, she languished for some time, under the wounds given her by a young and unskilful gladiator.

12.—FIFTH SUNDAY IN LENT.

Dominica in Passione, or Passion Sunday, was the name given to this day in missals; as the church now began to advert to the sufferings of Christ. In the north, it is called *Carling* Sunday, and grey peas, first steeped a night in water, and fried with butter, form the usual repast.

The peculiar custom in Northumberland (observes Mr. Hutchinson), is the serving up parched peas to the table. This seems to be derived from the severities of the Romish church in the early ages, at this

period in Lent, in their abstinence and mortification using such food. It was usual to give away beans in the dole at funerals, both with the heathen and the people of the Romish church. They are used as a kind of mourning dole on this day. Erasmus mentions an observation of Pliny's, concerning Pythagoras's interdiction of the use of beans, 'that they contain the souls of the dead.' Thence they were used in the Parentalia. Plutarch held, that pulse was of the highest efficacy for invoking the manes. The modern Greeks carry in funeral processions parboiled wheat.

12.—SAINT GREGORY.

Saint Gregory, surnamed the Great, was born about the year 540. Gadianus, his father, enjoyed the dignity of a senator, and was very wealthy. Our saint, in his youth, applied himself to the study of grammar, rhetoric, and philosophy; and afterwards to the civil law, and the canons of the church, in which he was well skilled. He was consecrated Pope about the year 590, and died in 604. Before his advancement to the see, Gregory projected the conversion of the English nation, but did not accomplish his wishes until he had assumed the papal chair.

17.—SAINT PATRICK.

The tutelar saint of Ireland was born in the year 371, in a village called *Bonaven Tabernæ*, probably Kilpatrick, in Scotland, between Dumbriton and Glasgow. He is, however, claimed as a Cambrian by Mr. Jones, in his 'Welsh Bards,' who makes him a native of Caernarvonshire. When sixteen years old, he was carried into captivity by certain barbarians, together with many of his father's vassals and slaves, and was taken to Ireland, where he kept cattle on the mountains and in the forests, in hunger and nakedness, amid snows, rain, and ice. After six months, our saint escaped from this slavery, only to fall into the hands of another master. At length

emancipated, he travelled into Gaul and Italy, and spent many years in preparing himself for the holy functions of a priest, studying intensely until his 55th or 60th year. Being successively ordained deacon, priest, and bishop, he received the apostolical benediction from Pope Celestine, and was sent by him, about the beginning of the year 432, to preach the gospel in Ireland. He died at the good old age of 123, and was buried at Down, in Ulster.

'Every day was he wont diligently to sing the entire psaltery, with many songs and hymns, and the Apocalypse of the apostle John, and two hundred prayers before God; three hundred times did he bend his knees in adoration of the Lord; every canonical hour of the day did he one hundred times sign himself with the sign of the cross. Nevertheless did he not omit every day worthily and devoutly to offer up unto the Father the sacrifice of the Son; and never ceased he to teach the people, or instruct his disciples.

'And in a wonderous manner dividing the night-season, thus did this wakeful guardian and labourer in the Lord's vineyard distinguish that also. For in the earliest part thereof having with two hundred genuflexions, and one hundred psalms, praised God, then applied he unto study; and in the latter part, he plunged himself into cold water, and raising his heart, his voice, his eyes, and his hands towards heaven, offered he one hundred and fifty prayers.—Afterward he stretched himself on a bare stone, and of another stone making a pillow, he rested his most sanctified body with a short sleep; or that more clearly we may speak, he refreshed himself unto the labour of his continual conflict.—With such rest indulging, he girded his loins with roughest hair-cloth, the which had been dipped in cold water.'—See *Jocelin's Life of St. Patrick, by Swift*, p. 245, 8vo, *Dublin*, 1809.

Many and extraordinary are the miracles recorded of St. Patrick by Jocelin; but without requiring the reader's assent to these (says the translator), the work ought not to be cast aside with contempt or ridicule. It tends to establish a point which the patriot feelings of every Irishman would gladly support; *The existence of St. Patrick, and the conversion of our country by his apostolic labours*:—nor can the improbability or the impossibility of its recorded wonders invalidate the presumption. Philosophy may disdain, and Pyrrhonism may deride the legendary page of old Jocelin; but as miracles of a much higher rank have too often met no higher respect, let us, before we pity the Monk of Furnes and gratulate our own superior wisdom, consider whether implicit belief be not at least as safe as absolute scepticism. The occasion, however, of these may not seldom be traced; the effects of natural causes, operating on enthusiastic minds, were gradually shaded by allegory and heightened by tradition, until the original act was exalted into a miracle.

Very consonant was it to the spirit of those early ages, unskilled in the science of that proud philosophy *which finds a reason for every thing*, to ascribe all peculiar events and appearances to some divine interposition; while the poetical language of the ancient Irish, like that of the Orientals, accorded with their religious feelings, and furthered what modern wisdom may term the delusion. When the thunder rolled over their heads, they heard the voice of God; when the lightning followed, they shrunk from the flash of his eye, or gazed on the course of his ministering angel: an eclipse, a comet, an earthquake, even the flowing of the tides, to them were objects of reverential wonder, and in the hands of a skilful or enthusiastic preacher possessed an influence, which, however we may smile, was directed to the wisest and the happiest purposes. Therefore, though the 'Acts' which Jocelin narrates may not be strictly

true, he is not to be accused of falsehood or imposture;—they were probably founded on truth;—at all events they can neither mislead our opinion, nor confound our judgments;—they can perplex no man's faith or impugn his creed. These, however, are negative merits;—they enforce the great doctrines of the christian religion, they inculcate the great duties of love to God and charity to man; while in language, always pure and often sublime, their scriptural illustrations and moral inferences recommend to piety and persuade to virtue. After this, their highest praise, I shall hardly applaud them as presenting a correct and amusive picture of antient manners; or as bearing testimony to the early splendour of Ireland, to the power of her princes, and the opulence of her chiefs.

The *Order of St. Patrick* was instituted by George III, in 1783. It consists of the sovereign, a grand master, a prince of the blood royal, and thirteen knights, making in the whole sixteen, and seven officers. The lord lieutenant for the time being is the grand master. The star is charged with three imperial crowns of gold, within a circle of gold, with the motto, QUIS SEPARABIT, MDCCLXXXIII, the whole surrounded with eight rays of silver; and is embroidered on the left side of the coat or cloak. The collar is of pure gold, composed of six harps and five roses, alternately joined together by five knots. In the centre before, is a crown, from which is suspended the badge or jewel of the order, of gold, enamelled, which (the rays excepted) is similar to the star.

18.—EDWARD KING OF THE WEST SAXONS.

He was son of Edgar, who first united the heptarchy into one kingdom; after whose death, in the year 975, Edward succeeded to the throne at fifteen years of age. Edward lived four years after his accession, and there passed nothing memorable during his reign. His death alone was memorable

and tragical. This young prince was endowed with the most amiable innocence of manners; and as his own intentions were always pure, he was incapable of entertaining any suspicion against others. Though his step-mother had opposed his succession, and had raised a party in favour of her own son, he always showed her marks of regard, and even expressed, on all occasions, the most tender affection towards his brother. He was hunting one day in Dorsetshire; and being led by the chase near Corfe-castle, where Elfrida resided, he took the opportunity of paying her a visit, unattended by any of his retinue, and he thereby presented her with the opportunity which she had long wished for. After he had mounted his horse, he desired some liquor to be brought him: while he was holding the cup to his head, a servant of Elfrida approached him, and gave him a stab behind. The prince, finding himself wounded, put spurs to his horse; but becoming faint by loss of blood, he fell from the saddle, his foot stuck in the stirrup, and he was dragged along by his unruly horse till he expired. Being tracked by the blood, his body was found, and was privately interred at Wareham by his servants.

'The youth and innocence of this prince, with his tragical death, begat such compassion among the people, that they believed miracles to be wrought at his tomb; and they gave him the appellation of martyr, though his murder had no connexion with any religious principle or opinion. Elfrida built monasteries, and performed many penances, in order to atone for her guilt; but could never, by all her hypocrisy or remorses, recover the good opinion of the public, though so easily deluded in those ignorant ages.'—(*Hume's Hist. of England*, vol. i, p. 128-9.)

19.—PALM SUNDAY.

In the missals, this day is denominated *Dominica in ramis Palmarum*, or Palm Sunday, and was so

called from the palm branches and green boughs formerly distributed on that day, in commemoration of our Lord's riding to Jerusalem. Sprigs of *box-wood* are still used as a substitute for *palms* in Roman Catholic countries.

On this day is still retained the antient usage of decorating churches and houses with evergreens, &c. It was the custom of the antient Christian church to represent our Saviour's entry into Jerusalem, on this day, by a procession with palms. In this country the buds of the willow, which is one of the earliest marks of vegetation shown by the trees of this climate, are gathered and adopted for branches of palm. Mr. Beame says, the branch of palm was used in the country near Jerusalem as an emblem of victory. Our adoption of the willow buds may arise from their being the first bloom which appears in the woods after the close of winter; and might be used also typically, from their bearing testimony of renovation, as a sacred emblem of victory over death.

Much ceremony is still observed by the Greek church in Russia on Palm Sunday. 'On the eve of this day,' says Dr. CLARKE, 'all the inhabitants of Moscow resort, in carriages, on horseback, or on foot, to the Kremlin, for the purchase of palm branches, to place before their *Boghs*, or images, and to decorate the sacred pictures in the streets, or elsewhere. It is one of the gayest promenades of the year. The governor attended by the *maître de police*, the commandant, and a train of nobility, go in procession, mounted on fine horses. The streets are lined by spectators; and cavalry are stationed on each side, to preserve order. Arriving at the Kremlin, a vast assembly, bearing artificial *bouquets* and boughs, are seen moving here and there, forming the novel and striking spectacle of a gay and moving forest. The boughs consist of artificial flowers, with fruit. Beautiful representations of oranges and le-

money, in wax, are sold for a few *copecks* (an English halfpenny). Upon this occasion, every person who visits the Kremlin, and would be thought a true Christian, purchases one or more of the boughs, called palm-branches'.'

21.—SAINT BENEDICT.

Benedict, or *Bennet*, was born at Norcia in Italy, about the year 480, and of an honourable family. Being sent by his parents to Rome to complete his studies, he became disgusted with the licentiousness of the Roman youth, and retired to the mountain of Subiaco, about forty miles from the city. Bennet was now only fifteen, and lived for three years in a cave, Romanus, a monk, giving him provisions; these were let down by a rope, with a bell affixed, to give notice to the holy recluse. Bennet founded the monastery of Cassino in 529: it was built on the brow of a very high mountain, on the top of which there was an old temple of Apollo, surrounded with a grove. The Benedictine order of monks, first instituted by our saint, was, in the ninth century, at its height of glory.

23.—MAUNDY THURSDAY.

This day is called in Latin *dies Mandati*, the day of the command, being the day on which our Lord washed the feet of his disciples, as recorded in the second lesson. This practice was long kept up in the monasteries. After the ceremony, liberal donations were made to the poor, of clothing and of silver money, and refreshment was given them to mitigate the severity of the fast. On the 15th April, 1731 (Maundy Thursday), the *Archbishop of York washed the feet* of a certain number of poor persons. James II. was the last king who performed this in person. A relic of this custom is still preserved in the donations dispensed at St. James's on this day.

The following is an account of the ceremony on

[1] Travels in Russia, vol. i.

Maundy Thursday, 1814. 'On this day the annual royal donations were distributed at Whitehall Chapel. In the morning, Dr. Carey, the Sub-Almoner, and Mr. Hanby, the Secretary to the Lord High Almoner, Mr. Nost, and others belonging to the Lord Chamberlain's office, attended by a party of the yeomen of the guard, distributed to seventy-five poor women, and seventy-five poor men, being as many as the king is years old, a quantity of salt fish, consisting of salmon, cod, and herrings, pieces of very fine beef, five loaves of bread, and some ale to drink the king's health. Mr. Hanby gave notice, that in future their cases must be certified by the minister of the parish, by order of the Lord Almoner. At three o'clock they assembled again, the men on one side the chapel, and the women on the other. A procession entered, of those engaged in the ceremony, consisting of a party of yeomen of the guard, one of them carrying a large gold dish on his head, containing 150 bags, with seventy-five silver pennies in each, for the poor people, which was placed in the royal closet. They were followed by the sub-almoner in his robes, with a sash of fine linen over his shoulder and crossing his waist. He was followed by two boys, two girls, the secretary, and another gentleman, with similar sashes, &c. &c. all carrying large nosegays. The church evening service was then performed, at the conclusion of which the silver pennies were distributed, and woollen cloth, linen, shoes and stockings, to the men and women; and according to antient custom, a cup of wine to drink the king's health.'

At Rome, Maundy Thursday is a day of great parade. The altar of the Capella Paolina is illuminated with more than four thousand wax tapers: 'and the pope and cardinals come thither in procession, bringing the sacrament along with them, and leaving it there. Next follows the august ceremony of the benediction, and afterwards the pope washes the feet of some pilgrims, and serves them at dinner.

The second grand ceremony at *Moscow* takes place on this day at noon, when the archbishop washes the feet of the apostles. 'The priests appeared in their most gorgeous apparel. Twelve monks, designed to represent the twelve apostles, were placed (in the cathedral) in a semicircle before the archbishop. The archbishop, performing all and much more than is related of our Saviour in the thirteenth chapter of St. John, takes off his robes, girds up his loins with a towel, and proceeds to wash the feet of them all until he comes to the representative of Peter, who rises; and the same interlocution takes place between him and the archbishop, which is said to have taken place between our Saviour and that apostle.'—(*Clarke's Russia.*)

24.—GOOD FRIDAY.

This day commemorates the sufferings of Christ, as a propitiation for our sins. Holy Friday, or the Friday in Holy Week, was its more antient and general appellation: the name Good Friday is peculiar to the English church. It was observed as a day of extraordinary devotion.

On this night, in St. Peter's, at Rome, 'the hundred lamps that burn over the tomb of the apostle are extinguished, and a stupendous cross of light appears suspended from the dome, between the altar and the nave, shedding over the whole edifice a soft lustre delightful to the eye and highly favourable to picturesque representations. This exhibition is supposed to have originated in the sublime imagination of Michael Angelo, and he who beholds it will acknowledge that it is not unworthy of the inventor. The magnitude of the cross hanging as if self-supported, and like a meteor *streaming in the air*; the blaze that it pours forth; the mixture of light and shade cast on the pillars, arches, statues and altars; the crowd of spectators placed in all the different attitudes of curiosity, wonder and devotion; the processions with

their banners and crosses gliding successively in silence along the nave and kneeling around the altar; the penitents of all nations and dresses collected in groupes near the confessionals of their respective languages; a cardinal occasionally advancing through the crowd, and, as he kneels, humbly bending his head to the pavement; in fine, the pontiff himself, without pomp or pageantry, prostrate before the altar, offering up his adorations in silence, form a scene singularly striking by a happy mixture of tranquillity and animation, of darkness and light, of simplicity and majesty.'—*Eustace's Tour in Italy*, vol. i, p. 371.

Buns, with crosses upon them, are usually eaten in London and some other places on this day, at breakfast. The use of buns (says Mr. Hutchinson) is derived from the consecrated sweet bread, which was offered on high festivals. It is of the highest antiquity: according to Mr. Bryant, 'the offerings which people in antient times used to present to the gods, were generally purchased at the entrance of the temple; especially every species of consecrated bread, which was denominated accordingly. One species of sacred bread which used to be offered to the gods, was of great antiquity, and called *boun*. The Greeks, who changed the *n* final into a *sigma*, expressed it in the nominative βους, but in the accusative more truly βουν, βουν. Hesychius speaks of the *boun*, and describes it a *kind of cake with a representation of two horns*. Julius Pollux mentions it after the same manner, *a sort of cake with horns*. Diogenes Laertius, speaking of the same offering being made by Empedocles, describes the chief ingredients of which it was composed: *He offered up one of the sacred libra, called a boun, which was made of fine flour and honey*. It is said of Cecrops, *he first offered up this sort of sweet bread*. Hence we may judge of the antiquity of the custom, from the times to which Cecrops is referred. The prophet Jeremiah takes notice of this

kind of offering, when he is speaking of the Jewish women at Pathros in Egypt, and of their base idolatry; in all which their husbands had encouraged them: the women, in their expostulation upon his rebuke, tell him, *Did we make her cakes to worship her?* &c. Jer. xliv, 18, 19. Ib. vii, 18.—Bryant's Analysis, vol. i, p. 297. The sacred cakes which were offered at the Arkite temples were styled *boun*, and were presented upon every seventh day.—Bryant, vol. ii. The custom of hot *eross buns* in London, on the morning of Good Friday, seems to have relation to these antient practices: we only retain the name and form of the *boun*; the sacred uses are no more.

25.—ANNUNCIATION OF THE B. V.M., *or Lady Day.*

This day celebrates the angel's message to the Virgin Mary, respecting our Blessed Lord. She was, probably, an only child, and but fifteen years of age when espoused to Joseph. She died A.D. 48, being about sixty years old.

25.—EASTER EVE.

Particular mortifications were enjoined to the earliest Christians on this day. From the third century, the fast was indispensable and rigid, being protracted always to midnight, sometimes to the cock-crowing, and sometimes to the dawn of Easter-day; and the whole of the day and night was employed in religious affairs.

26.—EASTER DAY, *or* EASTER SUNDAY.

Much difference of opinion prevailed in the Eastern and Western churches respecting the precise time of observing Easter; till, in 325, the Council of Nice declared, that the feast should be kept by all churches on the same day. Easter is styled by the fathers the highest of all festivals, the feast of feasts, the queen of festivals, and *Dominica Gaudii*, the joyous Sunday. Masters granted freedom to their slaves at this season, and valuable presents were made to the poor.

The third and most magnificent ceremony of all

those performed at Moscow, is that of 'The Resurrection,' which is celebrated two hours after midnight, on the morning of Easter Sunday. 'We hastened to the CATHEDRAL (observes Dr. Clarke), which was filled with a prodigious assembly of all ranks and sexes, bearing lighted wax tapers, to be afterwards heaped as vows on the different shrines. The walls, ceilings, and every part of this building, are covered by the pictures of saints and martyrs. In the moment of our arrival the doors were shut: and on the outside appeared PLATO, the archbishop, preceded by banners and torches, and followed by all his train of priests, with crucifixes and censers, who were making three times, in procession, the tour of the cathedral; chaunting with loud voices, and glittering in sumptuous vestments, covered with gold, silver, and precious stones. The snow had not melted so rapidly in the Kremlin as in the streets of the city; and this magnificent procession was therefore constrained to move upon planks over the deep mud which surrounded the cathedral. After completing the third circuit, they all halted opposite the great doors, which were shut; and the archbishop, with a censer, scattered incense against the doors, and over the priests. Suddenly those doors were opened, and the effect was beyond description grand. The immense throng of spectators within, bearing innumerable tapers, formed two lines, through which the archbishop entered, advancing with his train to a throne near the centre. The profusion of lights in all parts of the cathedral, and, among others, of the enormous chandelier which hung from the centre, the richness of the dresses, and the vastness of the assembly, filled us with astonishment. Having joined the suite of the archbishop, we accompanied the procession, and passed even to the throne, on which the police officers permitted us to stand, among the priests, near an embroidered stool of satin, placed for the archbishop. The loud chorus, which burst forth at the entrance to the church, continued

as the procession moved towards the throne, and after the archbishop had taken his seat.

'Soon after, the archbishop descended, and went all round the cathedral; first offering incense to the priest, and then to the people as he passed along. When he had returned to his seat, the priests, two by two, performed the same ceremony, beginning with the archbishop, who rose and made obeisance with a lighted taper in his hand. From the moment the church doors were opened, the spectators had continued bowing their heads and crossing themselves; insomuch, that some of the people seemed really exhausted by the constant motion of the head and hands.

'I had now leisure to examine the dresses and figures of the priests, which were certainly the most striking I ever saw. Their long dark hair, without powder, fell down in ringlets, or straight and thick, over their rich robes and shoulders: their dark thick beards, also, entirely covered their breasts. On the heads of the archbishop and bishops were high caps, covered with gems, and adorned by miniature paintings, set in jewels, of the Crucifixion, the Virgin, and the Saints. Their robes of various coloured satin were of the most costly embroidery; and even on these were miniature pictures set with precious stones. After two hours had been spent in various ceremonies, the archbishop advanced, holding forth a cross, which all the people crowded to embrace, squeezing each other nearly to suffocation. As soon, however, as their eagerness had been somewhat satisfied, he retired to the sacristy; where, putting on a plain purple robe, he again advanced, exclaiming three times, in a very loud voice, *Christ is risen!*

'The most remarkable part of the solemnity now followed. The archbishop, descending into the body of the church, concluded the whole ceremony by crawling round the pavement on his hand and knees, kissing the consecrated pictures, whether on the pil-

lars, the walls, the altars, or the tombs; the priests and all the people imitating his example. Sepulchres were opened, and the mummied bodies of incorruptible saints exhibited, all of which underwent the same general kissing.'

The august ceremonies performed at Rome, on this day, Whitsunday, and other festivals, will be noticed in our account of Whitsunday, MAY 14th, which see. For a variety of old English customs observed at Easter, we refer to T. T. for 1814, pp. 82-84.

27, 28.—EASTER MONDAY AND TUESDAY.

Every day in this week was formerly observed as a religious festival, sermons being preached and the sacrament administered. In many places, servants were permitted to rest from their usual employments, that they might constantly attend public worship. During fifteen days, of which the paschal solemnity consisted, the courts of justice were shut, and all public games, shows and amusements, were prohibited. It is unnecessary to observe, that this practice has long ceased, and that the Easter week is usually devoted to relaxation and amusement.

'At Moscow, after the grand ceremony of the Resurrection is completed, riot and debauchery instantly break loose; no meetings take place, of any kind, without repeating the expressions of peace and joy, *Christos voscress!* Christ is risen! to which the answer always is the same, *Vo istiney voscress!* He is risen indeed! On *Easter Monday* begins the presentation of the Paschal eggs: lovers to their mistresses, relatives to each other, servants to their masters, all bring ornamented eggs. Every offering, at this season, is called a Paschal egg. The meanest pauper in the street presenting an egg, and repeating the words *Christos voscress*, may demand a salute even of the empress. All business is laid aside; the upper ranks are engaged in visiting, balls, dinners, suppers, masquerades; while boors fill the air with

their songs, or roll drunk about the streets. Servants appear in new and tawdry liveries, and carriages in the most sumptuous parade.'—*(Clarke.)*

Astronomical Occurrences.

Of the Moon, its Phases and Motions.

Of all the bodies in the heavens, if we except the Sun, the Moon is the most splendid, and to us the most useful globe. To the Earth, indeed, she is an inseparable companion, and so closely allied to her, that to an inhabitant of the Sun she could never be seen at a greater distance than ten minutes. She is, by the great bond of attraction, so linked to the Earth, as to attend upon her in her journey round the Sun, though at the same time she has a proper orbit of her own, which she describes in a certain number of days.

In the last volume of this work we have given a pretty full account of the Moon (see p. 178-85); we however resume the subject, in order that, with the aid of figures, we may explain to the young astronomer the nature and causes of her phases and motions; and of the eclipses which she undergoes, and which sometimes, by her presence, she occasions to the Sun.

The Moon, as is known to every one, puts on several phases or appearances, and is almost perpetually changing her figure. Formerly, no doubt, her many forms must have puzzled the minds and understandings of those who contemplated her daily appearances. Sometimes she increases and grows bigger, then again she wanes and diminishes, as it were with old age. Sometimes she appears with horns; then she appears as a half circle: now she is of a gibbous form, and immediately after she assumes a most splendid globular face; after this she declines in lustre and glory, till at length she is lost for days together. At one

period of her revolution she enlightens us during the whole night; at others she does not come from beneath the horizon till late in the evening, or is perhaps only to be seen in the morning. Sometimes she keeps in the southern regions of the heavens; at others she mounts high into the northern hemisphere. All these facts were first observed and diligently watched by Endymion among the Greeks, who was so attentive to the business in which he had engaged, that he was said to have fallen in love with the object of his notice.

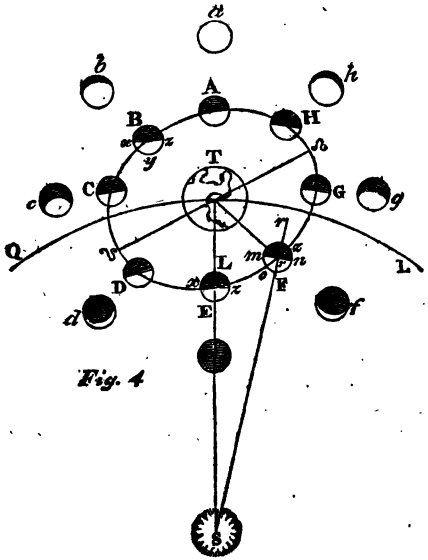


Fig. 4

The Moon, as we have already shown, like the Earth, shines with a light which she borrows from the Sun, being in her own nature a dark, opake, spherical body. It is the Sun that is the great luminary in our system, which always illuminates that half of the Moon's body which is turned towards him, while the other half, which is opposite, is involved in

darkness: but the face of the Moon that can be seen by the inhabitants of the Earth, is that which is turned towards the Earth; consequently, according to the various positions of the Moon in respect of the Sun and Earth, we shall observe different degrees of illumination; at one time a larger, at another a smaller portion of the illuminated surface is to be seen: sometimes her whole body is invisible, and at others we behold her with a full face. The reason of this will be readily understood by referring to the *figure* in p. 94, and attending to the description.

Let S represent the Sun, T the Earth, QL a portion of the Earth's orbit which it describes in its annual course round the Sun. Let ABCDEFGH be the orbit of the Moon, in which she turns round the Earth in the space of a month, from the west towards the east.

The motion of the Moon is evident to our senses; for if she be observed to arrive at the meridian any night with a fixed star, the next night she will be about 52 minutes later in coming to the meridian, or in southing, than the star; she having receded from the star about 13 degrees towards the east. The average is 52 minutes, sometimes is more than an hour, at others not above 15 or 20 minutes. Join the centres of the Sun and Moon, with the right line SL (see last *fig.*), and through the centre of the Moon imagine a plane *xz* to pass, to which the line SL is perpendicular: the section of that plane, with the surface of the Moon, will produce the circle which bounds light and darkness in her, and separates the enlightened face from the dark and obscure side. In the same manner, let the centres of the Earth and Moon be joined by the right line S*r* which is perpendicular to a plane *mn*, passing through the centre of the Moon; that plane will make, on the surface of the Moon, the circle which distinguishes the visible hemisphere, or that which is towards us, from the

invisible, which is turned from us; which circle may therefore be termed the circle of vision.

Hence it is manifest, that whenever the Moon is in the position A, in the point of its orbit opposite to the Sun, that then the circle bounding light and darkness and the circle of vision will coincide; and that all the illuminated face of the Moon will be turned towards the Earth, and be visible by its inhabitants as it appears at *a*. Then the Moon is said to be full, and she shines all night long; and in respect to the Sun, she is said to be in opposition: for the Sun and Moon, with respect to the Earth, are seen in opposite parts of the heavens, the one rising when the other sets. When the Moon comes to B, the whole illuminated disk *xyz* is not turned towards the Earth, there being a part of it at *x* not to be seen by us; and then the visible illumination will be deficient from a circle, and the Moon will have a gibbous form, such as is marked in *b*. The Moon arriving at C, there only one half of the illuminated disk is turned towards the Earth, and to be seen from thence; and then we observe a Half-Moon as in *c*, and she is said then to be bisected. In this situation the Sun and Moon are a fourth part of a circle removed from each other, and the Moon is said to be in her quadrature. The Moon going forward to D, the illuminated face has but a small portion of itself turned towards the Earth, and the side of the Moon turned towards the Earth is for the greatest part in darkness: and therefore of the spherical figure of the Moon which appears to us to be plain, that small part which shines upon us will seem to be bended into narrow points or angles, and will look like what we call horns; for there the circle bounding light and darkness with the circle of vision, doth form two small angles at their intersections, and the phasis seen from the Earth will appear as in *d*. The Moon at last coming to E, will show no part of its illuminated face to the Earth, but

all the dark side of the Moon will be turned towards it; and then she disappears, and is said to be in conjunction with the Sun, the Sun and she being in the same point of the ecliptic. This position we call change or new Moon. When the Moon advances farther to F, she again assumes a horned or crooked figure; and as before the new Moon the horns were turned westward, so now, after the time of new Moon, they change their positions and look eastward. When the Moon has proceeded to G, and is again in quadrature with the Sun, she will appear bisected, and like a Half-Moon. In H she will be bigger, but will still be deficient from a whole circle, and be seen gibbous: but in A she will again appear circular, and in her full splendour.

Table of the Sun's Rising and Setting every 10th Day:—

Wednesday	1st,	Sun rises 6 h. 36 m.	Sun sets 5 h. 24 m.
Saturday	11th,	- - - - - 6 h. 16 m.	- - - - - 5 h. 44 m.
Tuesday	21st,	- - - - - 5 h. 56 m.	- - - - - 6 h. 4 m
Friday	31st,	- - - - - 5 h. 36 m.	- - - - - 6 h. 24 m.

Equal day and night on the 19th.

			m.	s.
Wednesday, - -	1,	to the time shown on the dial *add*	12	45
Monday, - - - -	6,	- - - - - - - - - - - -	11	40
Saturday, - - -	11,	- - - - - - - - - - - -	10	25
Thursday, - - -	16,	- - - - - - - - - - - -	9	2
Tuesday, - - -	21,	- - - - - - - - - - - -	7	33
Sunday, - - -	26,	- - - - - - - - - - - -	6	0
Friday, - - - -	31,	- - - - - - - - - - - -	4	27

The Sun enters the sign Aries on the 21st, at 36 m. past 11 in the forenoon.

Mercury will be stationary on the 6th; the Herschel on the 10th; and Mercury again on the 28th.

The Moon will enter her last quarter on the 2d, at 8 m. past 10 in the forenoon: it will be new Moon or at change on the 11th, at 21 m. past 3 in the morning: it enters its first quarter at 19 m. past 2 in

the morning of the 18th, and is full at 37 m. past 6 in the morning of the 25th.

The Moon may be seen on the meridian on the

2d day, 16 m. past 5 in the morning.
20th - - - 8 - - - - 8 - - - evening.
22d - - - 6 - - - - 10 - - - evening.
24th - - 54 - - - - 11 - - - evening.

Table of the Eclipses of Jupiter's 1st Satellite:—

2d - - - - 15 m. after midnight.
10th - - - 8 - - - - - 2 in morning.
11th - - - 36 - - - - - 8 - evening.
17th - - - 2 - - - - - 4 - morning.
18th - - - 31 - - - - - 10 - evening.
25th - - - 25 - - - - - midnight.
27th - - - 4 - - - - - 9 - evening.

This last refers to the emersion or ending of the eclipse; all the others, to the immersions or beginnings.

HISTORY OF ASTRONOMY.

[Continued from p. 65.]

The progress of astronomy was considerably accelerated by the establishment of the school of Plato, and though its founder was chiefly celebrated for his knowledge of mathematics and philosophy, yet he entertained a correct idea of the science of astronomy. It has been inferred from some passages in his Timæus, and in Diogenes Laertius, that he believed the planets were originally projected in right lines, and that they were drawn from those right lines, and caused to move in circular or elliptical paths by the action of some principle which has long since been denominated *gravity*. Eudoxus, the friend of Plato, was led by a desire of studying astronomy, into Egypt, Italy, and some parts of Asia, where he collected all the observations that had been made on the rising and setting of the stars. He was introduced to the priests of Heliopolis, who instructed him in his favourite science, and, when he returned

to Greece, he corrected the calendar, by rendering the solar and lunar periods more accurate. He is supposed to have discovered the inclination of the Moon's orbit, and the retrograde motion of the Moon's nodes: he described the various constellations, and explained the times of the rising and setting of the stars.

From Aristotle, who flourished in the fourth century before Christ, astronomy does not appear to have derived any advantage; but he observed a comet whose tail occupied nearly a third of the heavens: he observed likewise an occultation of Mars by the Moon, which, according to the calculation of Kepler, happened in the year 357, and he had the good fortune to witness an occultation of one of the stars of Gemini by the planet Jupiter.

The history of astronomy was written about this time by Eudemus and Theophrastus, but both their works are lost. Helicon, of Cizicene, predicted an eclipse, which happened at the time he announced. Theophrastus supposed the two celestial hemispheres were badly joined together, and that the milky way was occasioned by the light that passed through the opening. Opuntius, one of Plato's disciples, composed several works on the distances of the Sun and Moon, and on the magnitudes and eclipses of these luminaries. About the same time Calippus, perceiving the errors of the Metonic period, proposed another named after himself, the Calippic period, which consisted of seventy-six years, containing 940 lunations; which was adopted in the year 330 A.C. Besides improving the calendar, Calippus collected many observations on the rising of the stars, and, for the purposes of agriculture, he added certain meteorological predictions which they seemed to authorise.

Pytheas, one of the last Greek astronomers, flourished at Marseilles in the time of Alexander, and travelled into Iceland, where, at the time of the

summer solstice, he saw the Sun touching the northern point of the horizon: he also ascertained, by means of a gnomon, that the obliquity of the ecliptic was equal to 23° 50′. He is said to have discovered the dependence of the tides upon the Moon.

Notwithstanding the important discoveries which have been recorded, yet astronomy had not assumed the rank of a science. The form and position of the planetary orbits were completely unknown: the Sun, the Moon, the planets, and fixed stars, were all crowded about the Earth, at distances of which no accurate conceptions could be formed; but no sooner was the Alexandrian school established, than a vigorous impulse was given to the mind. Astronomy assumed a new form, the stars retreated into a space that seemed to set defiance to human calculation, and the planetary system was left at an immeasurable distance from the sidereal firmament: the paths of the planets were carefully traced, and their relative situations rudely determined; the positions and progressive motion of the fixed stars were ascertained, and, by a series of observations, made with instruments, and reduced by trigonometrical calculations, a system of astronomy was created, which paved the way for those sublime views of creation which the science of the heavens was destined to unfold.

When the immense territories which Alexander had acquired were divided among his generals, Egypt fell to the share of Ptolemy Soter, whose learning and munificence attracted crowds of philosophers to Alexandria. His successor Philadelphus inherited the virtues as well as the throne of his father, and he held out new encouragement to learning, and in a short time all the wisdom of Greece was concentrated in the capital of Egypt. A superb building, composed of galleries and grand apartments, was devoted to the accommodation of the philosophers. The library of Demetrius Phalareus

was added to this noble establishment, and every book and instrument was procured which could contribute to the advancement of learning and real science. Ptolemy did more; he encouraged the philosophers of the Alexandrian school by his own example, and inspired them with that ambition of excellence which called into action every exertion of industry, and every spring of genius. 'The possession of a crown,' says the historian, 'is a poor inheritance, unless when it is subservient to the advancement of the human species. The splendour of a throne, and the bloody achievements by which it is frequently supported, may captivate vulgar admiration, but the true philosopher is affected only with the wisdom and virtue of him who fills it. The name of Ptolemy Philadelphus will be associated with the history of human knowledge, and will be cherished in the recollection of future ages, when time has effaced from the page of history the triumphs and the very names of tyrants.'—*See Edinburgh Encyclop., art. Astronomy.*

Among the first ornaments of the Alexandrian school were Aristillus and Timocharis, who flourished about 300 years before Christ. They were employed in observations on the planets, and in determining the position of the stars with regard to the equinoxes and the equator. From the *former* Ptolemy deduced his theory of the planetary motions, and by the *latter* Hipparchus determined the precession of the equinoxes, hereafter to be described. Aristarchus, of Samos, observed the summer solstice in the year 281 A.C.

Eratosthenes, born at Cyrene, A.C. 276, was invited to Alexandria by Ptolemy Euergetes, and appointed keeper of the royal library; and by means of the instruments which he found there he was enabled to ascertain that the obliquity of the ecliptic was 23° 51′ 20″. This philosopher is chiefly distinguished for his ingenious method of ascertaining

the diameter of the Earth, by measuring the celestial arc between the zeniths of two places situated on the same meridian. At Sienna, one of the most southern cities of antient Egypt, he observed a deep well, which, at the time of the summer solstice, was completely enlightened by the Sun, and hence he concluded that the Sun was in the zenith of this place.

Conon, of Samos, who flourished about the year 260 A.C., made several observations on the rising and setting of the fixed stars, and he collected all the eclipses that had been noted by the Egyptians. Archimedes, who died in the year 212, made observations on the solstices, and constructed a sphere in which the motions of the Sun, Moon, and five planets, were represented with their several velocities. Apollonius, of Pergæa, seems to have been the first person who explained the stations and retrogradations of the planets: he also effected an alliance between geometry and astronomy.

Hipparchus, who flourished at Alexandria about the year 140 A.C., after verifying the obliquity of the ecliptic, as settled by Eratosthenes, and fixing the latitude of the city of Alexandria, began his career by determining the tropical period of the Sun, and he saw the accuracy which would arise from employing two distant observations, which comprehended several revolutions of the Sun. With this view he compared an observation of his own on the solstices with one of Aristarchus, which had been made nearly a century and a half before, and found the length of the tropical year to be 365 days, 5 hours, 51′ 12″. He discovered that 187 days elapsed between the vernal and autumnal equinox, while the interval between the autumnal and vernal equinox was only 178 days. He made many other important discoveries, and the appearance of a new star in the heavens excited this astronomer to one of the grandest undertakings in the history of science. In order

that future astronomers might be acquainted with changes in the heavens, he resolved to form a catalogue of the fixed stars, containing their apparent magnitudes, and their position in the heavens. He completed this arduous task by fixing the longitudes and latitudes of 1022 stars. Hipparchus was the first who determined the situation of places on the earth by their latitudes and longitudes. He fixed upon the Canary islands as the place of the first meridian, he pointed out the method of finding the longitude by eclipses of the Moon, and he proposed to form a catalogue of terrestrial longitudes and latitudes. The principal works of this astronomer perished in the conflagration which destroyed the Alexandrian library; but his catalogue of the stars is preserved in the Almagest of Ptolemy.

[To be continued.]

The Naturalist's Diary.

Fled now the sullen murmurs of the north,
The splendid raiment of the SPRING peeps forth;
Her universal green, and the clear sky,
Delight still more and more the gazing eye.
Wide o'er the fields, in rising moisture strong,
Shoots up the simple flower, or creeps along
The mellowed soil.

THE month of March is, in general, cold and windy, particularly in late springs, which are always the most favourable to vegetation. In this month the pheasant (*phasianus colchichus*) crows; the goose sits on its eggs; the duck (*anas boschas*) lays; hens sit; the crow (*corvus corone*) builds; and the golden-crowned wren (*motacilla regulus*) begins its song. The *rooks* are now fully employed in building and repairing their nests. The mischief committed by rooks, in plucking up springing corn, and other vegetables, is amply compensated for by the destruction they commit among grubs and chaffers.

Those birds which have passed the winter in England now take their departure for more northerly regions. The field-fares (*turdus pilaris*) travel to Russia, Sweden, and Norway, and even as far as Siberia. They do not arrive in France till December, when they assemble in large flocks of two or three thousand. The red-wing (*turdus iliacus*), which frequents the same places, eats the same food, and is very similar in manners to the field-fare, also takes leave of this country for the season. Soon afterwards the woodcock (*scolopax rusticola*) wings its aërial voyage to the countries bordering on the Baltic. *Yea, the stork in the heaven knoweth her appointed times; and the turtle, and the crane, and the swallow, observe the time of their coming.*—JEREMIAH.

> Who bid the stork, Columbus-like, explore
> Heavens not his own, and worlds unknown before?
> Who calls the council, states the certain day?
> Who forms the phalanx, and who points the way? POPE.

The migration of birds has been justly considered as one of the most wonderful instincts of nature. Milton styles the feathered race, thus divinely taught, 'intelligent of seasons;' and the venerable prophet above adduces this instinctive and invariable observation of their appointed times, as a circumstance of reproach to the chosen people of God, who, although taught by reason and religion, '*knew not*,' he adds, '*the judgment of the Lord.*'—Jer. chap. viii, v. 7.

The appearance and disappearance of the birds of season, particularly in the Hebrides, or Western Islands of Scotland, has not been disregarded by our own poets. Thus Mallet speaks of the birds that annually transmigrate to St. Kilda, the most remote and unfrequented of all those islands:

> But, high above, the season full exerts
> Its vernant force in yonder peopled rocks,
> To whose wild solitude, from worlds unknown,
> The birds of passage transmigrating come,
> Unnumbered colonies of foreign wing,

At Nature's summons, their aërial state
Annual to found; and in bold voyage steer,
O'er this wide ocean, through yon pathless sky,
One certain flight to one appointed shore:
By heaven's directive spirit, here to raise
Their temporary realm; and form secure,
Where food awaits them copious from the wave,
And shelter from the rock, their nuptial leagues:
Each tribe apart, and all on tasks of love,
To hatch the pregnant egg, to rear and guard
Their helpless infants, piously intent.

Their appearance in the same islands is thus noticed by Thomson: —

——Where the northern ocean, in vast whirls,
Boils round the naked melancholy isles
Of farthest Thulé, and th' Atlantic surge
Pours in among the stormy Hebrides;
Who can recount what transmigrations there
Are annual made? What nations come and go?
And how the living clouds on clouds arise?
Infinite wings! till all the plume-dark air,
And rude resounding shore, are one wild cry.

And their disappearance from the same scenes is thus described by Mrs. Barbauld:—

When Winter bites upon the naked plain,
Nor food nor shelter in the groves remain,
By instinct led, a firm united band,
As marshalled by some skilful general's hand,
The congregated nations wing their way
In dusky columns o'er the trackless sea;
In clouds unnumbered annual hover o'er
The craggy Bass, or Kilda's utmost shore:
Thence spread their sails to meet the southern wind,
And leave the gathering tempest far behind,
Pursue the circling sun's indulgent ray,
Course the swift seasons, and o'ertake the day.

The migration of birds, which is common to the quail, the stork, the crane, the fieldfare, the woodcock, the nightingale, the cuckoo, the martin, the swallow, and various others, is, indeed, a very curious article in natural history, and furnishes a very striking instance of a powerful instinct impressed by the Creator. Dr. Derham observes two circumstances

remarkable in this migration: the first, that these untaught, unthinking creatures, should know the proper times for their passage, when to come, and when to go; as also, that some should come when others go. No doubt the temperature of the air as to heat and cold, and their natural propensity to breed their young, are the great incentives to these creatures to change their habitations. But why should they at all change their habitations? And why is not some certain place to be found, in all the terraqueous globe, that, all the year round, can afford them convenient food and habitation?

The second remarkable circumstance is, that they should know which way to steer their course, and whither to go. What instinct is it that can induce a little defenceless bird to venture over vast tracts of land and sea? If it be said, that by their high ascents into the air, they can see across the seas; yet what shall instruct or persuade them, that another land is more proper for their purpose than this? That Great Britain, for instance, should afford them better accommodations than Egypt, the Canaries, Spain, or any of the other intermediate countries[1]?

The melody of birds now gradually swells upon the ear. The throstle (*turdus musicus*), perched on the leafless bough of a lofty tree, charms us not only with the sweetness but the variety of its lays. This bold and pleasing songster, from his high station, seems to command the concert of the grove, while, in the beautiful language of the poet,

> The jay, the rook, the daw,
> And each harsh pipe (discordant heard alone),
> Aid the full concert, while the stock-dove breathes
> A melancholy murmur through the whole.

What lover of nature's music, but is charmed with the various notes and modulations of our English singing birds? The sweetness of the throstle;—the

[1] This subject will be resumed in the *Naturalist's Diary* for April.

cheerfulness of the sky-lark;—the mellowness of the thrush, building near the misletoe;—the imitative talent of the bull-finch;—the varied and familiar language of the red-breast, endeared to us, from our youth, by so many agreeable associations;—the wood-lark, priding herself in being little inferior to the nightingale, and making her home in lair-ground, under large tufts of grass, to shelter her from the cold;—the vivacity of the wren, forming her nest with dry leaves and moss, among hedges and shrubs encircled with ivy;—the solemn cry of the owl;—and the soft note of the linnet, building upon heaths with roots, and among thorns with moss, and subject to the disorder of melancholy!—not one of these birds breathes a single note, that is not listened to with pleasure:—

> Happy commoners!
> That haunt in woods, in meads, in flowery gardens,
> Rifle the sweets and taste the choicest fruits,
> Yet scorn to ask the lordly owner's leave.
>
> ROWE.

In this month trouts begin to rise; blood-worms appear in the water; black ants (*formica nigra*) are observed; the black-bird and the turkey (*meleagris gallopavo*) lay; and house-pigeons sit. The wheat-ear (*sylvia œnanthe*) appears; and the green-finch (*loxia chloris*) sings. The bat (*vespertilio*) is seen flitting about, and the viper uncoils itself from its winter sleep.

Titmice now pick off the defective buds of fruit trees, in search of insects. These little birds are considered by gardeners as peculiarly injurious, by destroying the bloom buds, and, in consequence, are persecuted by them without mercy. But, were they to examine carefully the fragments of the buds, which, in this search, the birds scatter about the ground, they would observe that each had been pierced by an insect, which alone had been the object of pursuit. These insects would not only have destroyed the buds

they had immediately attacked, but would have given birth to a number of others equally injurious with themselves. The titmice, therefore, in picking off such buds as contain them, ought rather to be considered the preservers, than the destroyers of fruit.

Frogs, enlivened by the warmth of spring, rise from the bottom of ponds and ditches, where they have lain torpid during the winter. The smelt (*salmo eperlanus*) begins to ascend rivers to spawn, when they are taken in great abundance.

On the 20th the vernal equinox takes place. All nature feels her renovating sway, and seems to rejoice at the retreat of winter. Yet, such is the fickleness of an English climate, and so short are its spring and summer, that we are often led, in this and the succeeding month, to exclaim with one of the most interesting poets of the present day—

> Ah! why, unfeeling WINTER! why
> Still flags thy torpid wing?
> Fly, melancholy season, fly,
> And yield the year to SPRING.
>
> When on the mountain's azure peak
> Alights her airy form,
> Cold blow the winds—and dark and bleak
> Around her rolls the storm.
>
> She seeks the brook—the faithless brook,
> Of her unmindful grown,
> Feels the chill magic of thy look,
> And lingers into stone. MONTGOMERY.

The sallow (*salix*) now enlivens the hedges; the aspen (*populus tremula*) and the alder (*alnus betula*) have their flowers full blown; the laurustinus (*viburnum tinus*) and the bay (*laurus nobilis*) begin to open their leaves. The equinoctial gales are usually most felt, both by sea and land, about this time.

Our gardens begin now to assume somewhat of a cheerful appearance. Crocuses, exhibiting a rich mixture of yellow and purple, ornament the borders; mezereon is in all its beauty; the little flowers with

silver crest and golden eye,' the daisies, are scattered over dry pastures[1]; and the pilewort (*ranunculus ficaria*) is seen on the moist banks of ditches. The primrose, also (*primula veris*), peeps out beneath hedges.

Herrick gives us the following pretty address to 'Primroses filled with Morning Dew.'

Why do ye weep, sweet babes? Can tears
Speak grief in you,
Who were but born
Just as the modest morn
Teemed her refreshing dew?

[1] Burns has the following lines 'on turning down a mountain daisy with the plough'. We can only extract a part of this beautiful little poem.

Wee, modest, crimson-tipped flow'r,
Thou'st met me in an evil hour;
For I maun crush amang the stoure
Thy slender stem:
To spare thee now is past my pow'r,
Thou bonnie gem.

Alas! it's no thy neebor sweet,
The bonnie *Lark*, companion meet!
Bending thee 'mang the dewy weet!
Wi' spreckled breast,
When upward-springing, blythe, to greet
The purpling East.

Cauld blew the bitter-biting North
Upon thy early, humble birth;
Yet cheerfully thou glinted forth
Amid the storm,
Scarce reared above the Parent-earth
Thy tender form.

The flaunting flow'rs our gardens yield,
High shelt'ring woods and wa's maun shield;
But thou, beneath the random bield
O' clod or stane,
Adorns the histie *stibble-field*,
Unseen, alane.

There, in thy scanty mantle clad,
Thy snawie bosom sun-ward spread,
Thou lifts thy unassuming head
In humble guise:
But now the *share* uptears thy bed,
And low thou lies!

Alas! you have not known that show'r
That mars a flow'r;
Nor felt th' unkind
Breath of a blasting wind;
Nor are we worn with years;
Or warped, as we,
Who think it strange to see
Such pretty flow'rs, like to orphans young,
To speak by tears before ye have a tongue.
Speak, whimp'ring younglings; and make known
The reason why
Ye droop, and weep.
Is it for want of sleep;
Or childish lullaby?
Or that ye have not seen as yet
The violet?
Or brought a kiss
From that sweetheart to this?
No, no; this sorrow, shown
By your tears shed,
Would have this lecture read,
'That things of greatest, so of meanest worth,
'Conceived with grief are, and with tears brought forth.'

The leaves of honeysuckles are nearly expanded; in our gardens, the buds of the cherry tree (*prunus cerasus*), the peach (*amygdalus persica*), the nectarine, the apricot, and the almond (*prunus armeniaca*), are fully opened in this month. The buds of the hawthorn (*cratægus oxycantha*) and of the larch-tree (*pinus larix*) begin to open; and the tansy (*tanacetum vulgare*) emerges out of the ground; ivy-berries are ripe; the daffodil (*pseudonarcissus*) in moist thickets, the rush (*juncus pilosus*), and the spurge laurel (*daphne laureola*) found in woods, are now in bloom. The common whitlow grass (*draba verna*) on old walls; the yellow Alpine whitlow grass (*draba aizoides*) on maritime rocks; and the mountain pepper-wort (*lepidum petræum*) among limestone rocks, flower in this month.

In many places, a great havoc is made, in this month, among sparrows and other small birds by the farmer; and rewards are sometimes offered for their destruction by the churchwardens. How ignorant are the generality

of mankind of their own good! This order includes no fewer than forty different kinds of birds which do not eat a single grain of corn, but which, in the course of the spring and summer, devour millions of insects that would otherwise prove infinitely more injurious to the farmer, than all the sparrows that haunt his fields, were they ten times more numerous than they are. And even with respect to sparrows, which are certainly, in some measure, injurious to the crops, were the farmer seriously to reflect that the Almighty has not formed any race of beings whatever without giving to them an important destination, he would not probably be so anxious for *their* destruction. It has been satisfactorily ascertained that a single pair of common sparrows, while their young ones are in the nest, destroy on an average above *three thousand caterpillars* every week! At this rate, if all the species of small birds were to be extirpated, what would then become of the crops?

The sweet violet (*viola odorata*) sheds its delicious perfumes in this month.

To a VIOLET.

Though from thy bank of velvet torn,
Hang not, fair Flower, thy drooping crest;
On Delia's bosom shalt thou find
A softer, sweeter bed of rest.

Though from mild zephyr's kiss no more
Ambrosial balms thou shalt inhale,
Her gentle breath, whene'er she sighs,
Shall fan thee with a purer gale.

But thou be grateful for that bliss
For which in vain a thousand burn,
And, as thou stealest sweets from her,
Give back thy choicest in return. RUSSELL.

Towards the latter end of the month, bees (*apis mellifica*) venture out of their hives. From the researches of MM. Bonnet and Huber we glean some curious information. The following is the

manner in which bees proceed in forming capacious cells for the workers' grubs destined to royalty[1].

'Bees soon become sensible of having lost their queen, and in a few hours commence the labour necessary to repair their loss. First, they select the young common worms, which the requisite treatment is to convert into queens, and immediately begin with enlarging the cells where they are deposited. Their mode of proceeding is curious; and the better to illustrate it, I shall describe the labour bestowed on a single cell, which will apply to all the rest containing worms destined for queens. Having chosen a worm, they sacrifice three of the contiguous cells; next they supply it with food, and raise a cylindrical inclosure around, by which the cell becomes a perfect tube, with a rhomboidal bottom; for the parts forming the bottom are left untouched. If the bees damaged it, they would lay open three corresponding cells on the opposite surface of the comb, and consequently destroy their worms, which would be an unnecessary sacrifice, and nature has opposed it. Therefore, leaving the bottom rhomboidal, they are satisfied with raising a cylindrical tube around the worm, which, like the other cells in the comb, is horizontal. But this habitation remains suitable to the worm called to the royal state only during the first three days of its existence: another situation is requisite for the other two days it is a worm. Then, which is so small a portion of its life, it must inhabit a cell nearly of a pyramidal figure, and hanging perpendicularly. The workers therefore gnaw away the cells surrounding the cylindrical tube, mercilessly sacrifice their worms, and use the wax in constructing a new pyramidal tube, which they solder at right angles to the first, and work it downwards. The diameter of this pyramid decreases insensibly from the base, which is

[1] For an account of the various kinds of bees inhabiting a hive, see T.T. for 1814, p. 72.

very wide, to the point. In proportion as the worm grows, the bees labour in extending the cell, and bring food, which they place before its mouth, and around its body, forming a kind of cord around it. The worm, which can move only in a spiral direction, turns incessantly to take the food before its head: it insensibly descends, and at length arrives at the orifice of the cell. Now is the time of transformation to a nymph. As any further care is unnecessary, the bees close the cell with a peculiar substance appropriated for it, and there the worm undergoes both its metamorphoses.

'Whenever the workers perceive that there are two rival queens in the hive, numbers of them crowd around each: they seem to be perfectly aware of the approaching deadly conflict, and willing to prompt their amazonian chieftains to the battle; for, as often as the queens show a disinclination to fight, or seem inclined to recede from each other, or to fly off, the bees immediately surround and detain them; but when either combatant shows a disposition to approach her antagonist, all the bees forming the clusters instantly give way to allow her full liberty for the attack. It seems strange that those bees who in general show so much anxiety about the safety of their queen, should, in particular circumstances, oppose her preparations to avoid impending danger,—should seem to promote the battle, and to excite the fury of the combatants.

'When a queen is removed from a hive, the bees do not immediately perceive it; they continue their labours, watch over the young, and perform all their ordinary occupations. But, in a few hours, agitation ensues; all appears a scene of tumult in the hive. A singular humming is heard; the bees desert their young, and rush over the surface of the combs with a delirious impetuosity. They have now evidently discovered that their sovereign is gone; and the rapidity with which the bad news now spreads through the hive, to the opposite side of the combs, is

very remarkable. On replacing the queen in the hive, tranquillity is almost instantly restored. The bees, it is worthy of notice, recognize the individual person of their own queen. If another be palmed upon them, they seize and surround her, that she is either suffocated or perishes by hunger; for it is very remarkable, that the workers are never known to attack a queen bee with their stings. If, however, more than eighteen hours have elapsed before the stranger queen be introduced, she has some chance to escape: the bees do at first seize and confine her, but less rigidly; and they soon begin to disperse, and at length leave her to reign over a hive in which she was at first treated as a prisoner. If twenty-four hours have elapsed, the stranger will be well received from the first, and at once admitted to the sovereignty of the hive. In short, it appears that the bees, when deprived of their queen, are thrown into great agitation; that they wait about twenty hours, apparently in hopes of her return, but that, after this interregnum, the agitation ceases; and they set about supplying their loss by beginning to construct royal cells. It is when they are in this temper, and not sooner, that a stranger queen will be graciously received; and upon her being presented to them, the royal cells, in whatever state of forwardness they may happen to be, are instantly abandoned, and the larvæ destroyed.

'It is well known, that after the season of swarming, a general massacre of the drones is commenced. Several authors assert in their writings, that the workers do not sting the drones to death, but merely harass them till they be banished from the hive, and perish. M. Huber contrived a glass table, on which he placed several hives, and he was thus able to see distinctly what passed in the bottom of the hive, which is generally dark and concealed: he witnessed a real and furious massacre of the males, the workers thrusting their stings so deep into the bodies of the de-

fenceless drones, that they were obliged to turn on themselves as on a pivot, before they could extricate them. The work of death commenced in all the hives much about the same time. It is not, however, by a blind or indiscriminating instinct that the workers are impelled thus to sacrifice the males; for if a hive be deprived of its queen, no massacre of the males takes place in it, while the hottest persecution rages in all the surrounding hives. In this case, the males are allowed to survive over winter.'

Our limits forbid us to dwell any longer upon the nature and economy of this interesting insect;—we refer the reader, therefore, to the works before mentioned[1], and shall conclude our remarks with 'The Captived Bee, or little Filcher,' from our favourite, HERRICK:—

As Julia once a slumb'ring lay,
It chanced a bee did fly that way,
After a dew, or dew-like show'r,
To tipple freely in a flow'r.
For some rich flow'r he took the lip
Of Julia, and began to sip:
But when he felt he sucked from thence
Honey, and in the quintessence,
He drank so much he scarce could stir;
So Julia took the pilferer:
And thus surprised, as filchers use,
He thus began himself t'excuse:
Sweet lady-flow'r! I never brought
Hither the least one thieving thought;
But taking those rare lips of your's
For some fresh, fragrant, luscious flow'rs,
I thought I might there take a taste,
Where so much syrup ran at waste:
Besides, know this, I never sting
The flow'r that gives me nourishing;
But with a kiss, or thanks, do pay
For honey that I bear away.
This said, he laid his little scrip
Of honey 'fore her ladyship;
And told her, as some tears did fall,
That, that he took, and that was all.
At which she smiled, and bade him go

[1] See T. T. for 1814, p. 73, note.

And take his bag; but thus much know,
When next he came a pilf'ring so,
He should from her full lips derive
Honey enough to fill his hive[1].

In the latter end of March, chickens run about; a brimstone-coloured butterfly (*papilio rhamni*) appears; sea-kale begins to sprout; black beetles fly about in the evening; and bats issue from their places of concealment. Roach and dace float near the surface of the water, and sport about in pursuit of insects. Lobsters and prawns are first caught. Daffodils are in flower; peas appear above ground, and the male blossoms of the yew tree expand and discharge their farina. Sparrows are busily employed in forming their nests.

The garnets or soland geese (*pelicanus bassanus*) resort, in March, to the Hebrides, and other rocky isles of North Britain, to make their nests and lay their eggs (see T. T. for 1814, pp. 73, 74.) Young lambs are yeaned this month, and their sportive skipping and playing is truly amusive.

Say, ye that know, ye who have felt and seen,
Spring's morning smiles, and soul-enliv'ning green,
Say, did you give the thrilling transport way?
Did your eye brighten, when young lambs, at play,
Leaped o'er your path with animated pride,
Or gazed in merry clusters by your side?

The farmer dresses and rolls his meadows; spreads ant-hills; plants quicksets, osiers, &c.; sows flax seed, artificial grasses, beans and peas, broom and whin seeds, and grass seeds among wheat. About the 23d, he ploughs for and sows oats, and hemp and flax. A dry season is very important to the farmer, that he may get the seed early into the ground.—Bloomfield has expressed, with great truth and nature, the hopes and fears of the farmer, for the success of all his labours—no one, indeed, was better qualified to do this than the 'Farmer's Boy,' who, while he was

[1] Vincent Bourne has a pretty little poem on the Bee, entitled '*Innocens Prædatrix*'; it is translated by Cowper, in Hayley's Life, vol. iv, p. 379.

familiar with 'rural sights and rural sounds,' possessed all the warm fancy and refined feeling of a poet:—

The work is done; no more to man is given;
The grateful farmer trusts the rest to heaven.
Yet oft with anxious heart he looks around,
And marks the first green blade that breaks the ground.
In fancy sees his trembling oats uprun,
His tufted barley yellow with the Sun;
Sees clouds propitious shed their timely store,
And all his harvest gathered round his door.

APRIL.

APRIL is derived from *Aprilis*, of *aperio*, I open; because the earth, in this month, begins to open her bosom for the production of vegetables. The Saxons called this month *aster-monat*, from the goddess Gostex, or because the winds were found to blow generally from the east in this month.

Remarkable Days.

1.—LOW SUNDAY.

It was a custom among the primitive Christians, on the first Sunday after Easter-Day, to repeat some part of the solemnity of that grand festival; whence this Sunday took the name of *Low Sunday*, being celebrated as a feast, though in a lower degree. In Latin, this day is called *Dominica in Albis*, or rather *post Albas* (*i. e. depositas*), that is, the Sunday of taking off the *Chrysoms*, or white robes; because those who were baptized on Easter Eve now laid aside these garments, and deposited them in the churches, to be used as evidence against them, if they should, at any time, violate or deny that faith which they had professed at their baptism.

1.—ALL FOOLS' DAY.

On this day every body strives to make as many

fools as he can: the wit chiefly consists in sending persons on what are called sleeveless errands, for the *history of Eve's mother*, for *pigeon's milk*, *stirrup oil*, and similar ridiculous absurdities.

I am convinced (says Mr. Douce) that the antient ceremony of the 'Feast of Fools' has no connection whatever with the custom of making fools on the 1st of April. The making of April fools, after all the conjectures which have been formed touching its origin, is certainly borrowed by us from the French, and may, I think, be deduced from this simple analogy. The French call them April Fish (*Poissons d'Avril*), i. e. simpletons, or, in other words, silly mackerel, who suffer themselves to be caught in this month. But as, with us, April is not the season of that fish, we have very properly substituted the word 'FOOLS'.[1]'

FOOLS were formerly considered, in this country, as necessary appendages not only at court, but in the private families of the nobility and the opulent. They were kept at the English court to a late period: *Muckle John*, the fool of Charles I, and the successor of the famous *Archee Armstrong*, was, perhaps, the last of the *genus* FATUORUM in this country.

SHAKSPEARE has given us an admirable description of a fool, in his charming play of 'AS YOU LIKE IT.'

> *Jaq.* A fool, a fool!—I met a fool i' the forest,
> A motley fool! a miserable world!—
> As I do live by food, I met a fool;
> Who laid him down, and basked him in the sun,
> And railed on lady Fortune in good terms,
> In good set terms—and yet a motley fool.
> *Good-morrow, fool*, quoth I: *No, sir*, quoth he,
> *Call me not fool, till heaven hath sent me fortune:*
> And then he drew a dial from his poke;
> And looking on it with lack-lustre eye,
> Says, very wisely, *It is ten o'clock:*

[1] For further illustrations by *Poor Robin*, and some elegant verses on this light subject, see T. T. for 1814, p. 78-80.

Thus may we see, quoth he, *how the world wags:*
'Tis but an hour ago since it was nine;
And after one hour more, 'twill be eleven;
And so, from hour to hour, we ripe, and ripe,
And then, from hour to hour, we rot, and rot,
And thereby hangs a tale. When I did hear
The motley fool thus moral on the time,
My lungs began to crow like chanticleer,
That fools should be so deep contemplative;
And I did laugh, sans intermission,
An hour by his dial.—O noble fool!
A worthy fool! Motley's the only wear.
Duke Sen. What fool is this?
Jaq. O worthy fool!—One that hath been a courtier;
And says, if ladies be but young and fair,
They have the gift to know it: and in his brain—
Which is as dry as the remainder bisket
After a voyage—he hath strange places crammed
With observation, the which he vents
In mangled forms:—O, that I were a fool!
I am ambitious for a motley coat.

It may be collected both from the plays themselves, and from various other authorities, that the costume of the domestic fool in Shakspeare's time was of two sorts. In the first of these, the coat was motley or parti-coloured, and attached to the body by a girdle, with bells at the skirts and elbows, though not always. The breeches and hose close, and sometimes each leg of a different colour. A hood resembling a monk's cowl, which, at a very early period, it was certainly designed to imitate, covered the head entirely, and fell down over part of the breast and shoulders. It was sometimes decorated with asses' ears, or else terminated in the neck and head of a cock, a fashion as old as the fourteenth century. It often had the comb or crest only of the animal: whence the term *cockscomb* or *coxcomb* was afterwards used to denote any silly upstart. This fool usually carried in his hand an official sceptre or bauble, which was a short stick ornamented at the end with the figure of a fool's head, or sometimes with that of a doll or puppet. To this instrument there was frequently annexed an inflated skin or bladder, with which the fool bela-

boured those who offended him, or with whom he was inclined to make sport; this was often used by itself, in lieu, as it should seem, of a bauble. It was not always filled with air, but occasionally with sand, or peas. Sometimes a strong bat or club was substituted for the bauble.

CORIAT, in his *Crudities*, speaks of a 'Whitsuntide Foole, disguised like a foole, wearing a long coate, wherein there were many several pieces of cloth of divers colours, at the corners whereof there hanged the tails of squirrels.'

The discontinuance of the court fool had a considerable influence on the manners of private life; and we learn from one of Shadwell's plays, that it was then 'out of fashion for great men to keep fools.' But the practice was by no means abolished; it maintained its ground, in this country, so late as the beginning of the last century; and we have an epitaph, written by Dean Swift, on Dicky Pearce, the Earl of Suffolk's fool, who was buried in Berkley churchyard, June 18, 1728. This person was an idiot. Lord Chancellor Talbot kept a Welsh jester named Rees Pengelding. He was a very shrewd fellow, and rented a farm of his master. Being distrained on for his rent by an oppressive steward, who had been a tailor, and bore him a grudge, the surly fellow said to him on this occasion, 'I'll fit you, sirrah.' 'Then,' replied Rees, 'it will be the first time in your life that you ever fitted any one.' Another Welshman, called Will the taborer, was retained in a similar capacity, about the beginning of the last century, by Sir Edward Stradling, of St. Donat's castle, in Glamorganshire. He is said to have been a very witty fellow, and a man of strong intellects. Lord Bussy Mansel, of Margam, had likewise in his service one Robin Rush, an idiot by nature, but who often said very witty things. There are people now alive in Wales, or lately were, who well remembered him.

The sort of entertainment that fools were expected to afford, may be collected, in great variety, from our old plays, and particularly from those of Shakspeare; but perhaps no better idea can be formed of their general mode of conduct than from the following passage in a singular tract by Lodge, entitled *Wit's Miserie*, 1599, 4to. 'Immoderate and disordinate joy became incorporate in the bodie of a jeaster; this fellow in person is comely, in apparell courtly, but in behaviour a very ape, and no man; his studie is to coine bitter jeasts, or to shew antique motions, or to sing sonnets and ballads: give him a little wine in his head, he is continually fleating and making of mouthes: he laughs intemperately at every little occasion, and dances about the house, leaps over tables, out-skips mens heads, trips up his companion heeles, burns sack with a candle, and many all th feats of a lord of misrule in the countrie: feed him in his humour, you shall have his heart; in mere kindness he will hug you in his armes, kisse you on the cheeke, and rapping out an horrible oth, crie—God's soule, Tum, I love you, you know my poore heart; come to my chamber for a pipe of tobacco: there lives not a man in this world that I more honor. In these ceremonies you shall know his courting, and it is a speciall mark of him at the table, he sits and makes faces: keep not this fellow company, for, in *jugling* with him, your wardrobes shall be wasted, your credits crackt, your crownes consumed, and time (the most precious riches of the world) utterly lost.' —This is the picture of a real hireling or artificial fool[1].

3.—RICHARD, *Bishop.*

Richard, surnamed *de Wiche*, from a place in Worcestershire, where he was born, was educated at the

[1] See an ingenious Dissertation on the *Clowns and Fools of Shakspeare*, in MR. DOUCE'S excellent ILLUSTRATIONS of our immortal bard, vol. ii, pp. 299-332.

Universities of Oxford and Paris. He afterwards travelled to Bononia, where he studied the canon law for seven years. On his return home he was nominated to the see of Chichester by the chapter; but his appointment being opposed by the king, Richard appealed to Rome, and had his election confirmed by the pope, who consecrated him also at Lyons in the year 1245. He was as remarkable for his learning and diligence in preaching, as he was for integrity. Richard was canonized by Pope Urban.

4.—SAINT AMBROSE.

Our saint was born about the year 340, and was educated in his father's palace, who was Prætorian Præfect of Gaul. He ruled over the see of Milan with great piety and vigilance for more than twenty years; during which time he gave all his money to [illegible], and settled the reversion of his estate upon the church. He converted the celebrated St. Augustine to the faith, and at his baptism, in a miraculous manner, composed that divine hymn, so well known in the church by the name of *Te Deum*. He died aged 57, in the year of our Lord 396.

The 10th of April is observed by the *Jews*, as the anniversary of the death of the two sons of Aaron.—The 16th of April, also, is commemorated by this people, on account of the death of Eli the High-priest and his two sons, and the loss of the Ark.

19.—SAINT ALPHEGE.

A native of England, Alphege was first Abbot of Bath, then Bishop of Winchester, in the year 984, and, twelve years afterwards, Archbishop of Canterbury. In the year 1012, the Danes being disappointed of some tribute money which they claimed as due to them, they entered Canterbury, and burnt both the city and church, and the greater part of the inhabitants were put to the sword. After seven months' miserable imprisonment, the good archbishop was stoned to death at Greenwich.

23.—SAINT GEORGE.

Saint George is the patron Saint of England; for this the following reason is assigned: when Robert, Duke of Normandy, the son of William the Conqueror, was fighting against the Turks, and laying siege to the famous city of Antioch, which was expected to be relieved by the Saracens, St. George appeared with an innumerable army coming down from the hills all clad in white, with a red cross on his banner, to reinforce the christians; this so terrified the infidels, that they fled and left the christians in possession of the town. Under the name and ensign of St. George, our victorious Edward III, in 1344, instituted the most noble Order of the Garter. Its establishment is dated fifty years before the knights of St. Michael were instituted in France by Lewis XI; eighty years before the order of the Golden Fleece, established by Philip the Good, Duke of Burgundy, and one hundred and ninety before the order of St. Andrew was set up in Scotland by James V. The Emperor Frederic IV instituted, in 1470, an order of knights in honour of St. George; and an honourable military order in Venice bears his name. St. George is usually painted on horseback, and tilting at a dragon under his feet; but this representation is no more than an emblematical figure, purporting, that by his faith and christian fortitude he conquered the devil, called the dragon in the Apocalypse.—(*Butler.*)

There were some alterations made in the *Order* of the Garter in 1557, and 1788. It consists of twenty-six knights or companions, generally all peers or princes; of whom the King of England is sovereign, or chief. They are a corporation, having a great and little seal; their officers are, a prelate, chancellor, register, king at arms, and usher. They have also a dean and twelve canons, with petty canons, vergers, and twenty-six pensioners, or poor knights. The order is under the patronage or protection of *St. George* of Cappadocia, the tutelar saint of this king-

dom. Their college is held in Windsor-castle, within the chapel of *St. George*, and the chapter-house, erected by the founder for that purpose.

The origin of this order is differently related by different authors. The common account is, that it was erected in honour of a garter of the Countess of Salisbury, which she dropped in dancing, and which was picked up by King Edward; but our best antiquaries denounce this as fabulous. Camden, Fern, and others, think it was instituted on occasion of the victory obtained over the French at the battle of Cressy, when Edward ordered his garter to be displayed as a signal of battle: to commemorate this, he made a garter the principal ornament of the order, erected in memory of this signal victory, and a symbol of the indissoluble union of the knights.

The habit and ensigns of the order, are, a surcoat, garter, mantle, hood, george, collar, cap, and feathers. The motto on the garter and star is, *Honi soit qui mal y pense* (evil be to him that evil thinks). The garter is of blue velvet bordered with gold. The george is the figure of St. George, on horseback, in armour, encountering a dragon with a tilting spear, the whole of gold enamelled. It may be enriched with jewels at the pleasure of the possessor. It is worn across the right shoulder pendant to a garter blue or dark riband. The collar is of gold. Charles II ordained that the knights should always wear in public, embroidered on the left side of their coats or cloaks, the cross of St. George, surrounded with the garter, with rays of silver, forming a star of eight points.

This is the most antient and noble *lay* order in the world, and the only one which has been granted to foreign princes. Of this illustrious order there have been eight emperors of Germany; five kings of France; three kings of Spain; one king of Arragon; seven kings of Portugal; one king of Poland; two kings of Sweden; six kings of Denmark; two

kings of Naples; one king of Sicily and Jerusalem; one king of Bohemia; two kings of Scotland; five princes of Orange; and thirty-four foreign electors, dukes, margraves, and counts.

At a chapter held June 3d, 1786, it was ordained that, in future, this order should consist of the sovereign, and twenty-five knights, exclusive of the sons of his majesty, or his successors, who have been or shall be elected knights of this most noble order.

25.—SAINT MARK.

St. Mark's Gospel was written in the year 63. The order of Knights of St. Mark at Venice, under the protection of this evangelist, was instituted in the year 737, the reigning doge being always grand master:—their motto was '*Pax tibi, Marce, Evangelista Meus.*'

On the 25th of April, or 15th day of Nisan, is celebrated the *Jewish* festival of the Passover, or the Paschal Lamb, according to the directions given in the twelfth chapter of Exodus from the third to the twentieth verse, beginning with the words '*Speak ye unto all the congregation of Israel, saying, in the tenth day of this month* (*Nisan*) *they shall take to them every man a lamb without blemish, a male of the first year.*' On this occasion, every house was not only ordered to provide a lamb to be killed on the fourteenth day in the evening, but its blood was to be sprinkled on the door-posts, and the lamb eaten by the people in their travelling attire, because it was known, that, in consequence of the dreadful plagues, the Egyptians would send them forth in haste. They were also ordered to take of the blood, and strike it on the two side-posts of the door, and on the upper door-post of their houses, in order that, when the destroying angel passed through to smite all the first-born of the land of Egypt, seeing this blood, he would *pass over* the children of Israel, so that the plague should not be upon them to destroy

them. This feast of the Paschal Lamb, or the Passover, was therefore ordered to be kept throughout all generations, by an ordinance, for ever.

This festival is also called the Feast of *Unleavened Bread*, which is commanded to be eaten seven days: —the particular precepts for its observance are to be found in the twelfth chapter of Exodus, from the fifteenth to the twentieth verses. The prohibition against eating any kind of unleavened bread, during seven days, is enforced from several considerations, but, principally, because on this *self-same day* the Lord brought the armies of the Israelites out of the land of Egypt; and because *whoever eateth that which is leavened, even that soul shall be cut off from the congregation of Israel, whether he be a stranger or born in the land.*

In order that the wonderful deliverance of the Israelites should be perpetuated for ever by the Jewish nation, it was commanded that the Paschal lamb should be killed yearly on the fourteenth day of Nisan, which they now call *Erev Pasach*, or *Passover Eve.* This is the season during which, instead of bread, Passover cakes only are eaten. It is proper to add to the Scripture account, that, after the destruction of Jerusalem, the Jews found it requisite to make a law that the first two days of the Passover should be kept with peculiar strictness, instead of one; and, also, on the seventh and eighth days, instead of ending on the seventh; so that, according to this regulation, the Passover is now kept eight days. All the other festivals which, before that time, were celebrated only one day, are now ordered to be observed two days, *Yom Kipur*, or the Day of Atonement, excepted; and this is still celebrated, as originally commanded, from *eve to eve;* and, this year, on the 15th of October.

Among the antient Jews at Jerusalem, it was customary, when criminals had been condemned to death, to reserve them for execution till the celebra-

tion of the most solemn feasts, of which there were three in the year; viz. the *Passover*, the *Feast of Weeks*, and the *Feast of Tabernacles*. Then, when the Jews came up to Jerusalem to sacrifice, these malefactors were executed, in order *that all Israel might see and fear*.

30.—ROGATION SUNDAY.

This day takes its name from the Latin term *rogare*, to ask; because, on the three subsequent days, *supplications* were appointed by Mamertus, Bishop of Vienna, in the year 469, to be offered up with fasting to God, to avert some particular calamities that threatened his diocess.

Astronomical Occurrences.

Of the Moon, its Phases and Motions.

IN the introduction to the last month's Astronomical Occurrences we explained the causes of the different phases or appearances of the Moon; we now observe, that what the Moon is to us, our Earth is to the Moon, though in a much superior degree. As the Moon, by reflecting the light of the Sun, illuminates the Earth, so the Earth reflects the light of the Sun to her. But the surface of the Earth is about thirteen times larger than the surface of the Moon; if, therefore, both bodies have the same power or aptitude in reflecting the rays of light, according to their magnitude, the Earth will send back thirteen times as much light to the Moon as she receives from her, but at different periods of the Moon; for when the Moon is full to us, the Earth will be invisible to them; and when the Moon is at change, or at new Moon, the Earth will shine with a full face to her. The Earth also will, at different periods, appear to the inhabitants of the Moon horned in

her quarters, gibbous, &c., as the Moon does to us. To proceed to the Moon.

I. The horns of the Moon, before conjunction, are turned to the east; and after the conjunction, towards the west. For the Sun, after the conjunction, that is, after change or new Moon, setting *before*, that is, to the west of the Moon, illuminates the western side of the Moon's disk; whence its horns, which are towards the dark part of the disk, point to the east. The reverse of this takes place at the opposition, when the Moon is seen in the east, before the Sun rises. See the figure last referred to, p. 59.

II. When the Moon is horned, its obscure part is faintly visible by the reflected rays of the Sun from the Earth. That is, when the Moon is at D or F (see the last figure), near the conjunction, the enlightened hemisphere of the Earth will be towards the Moon, and reflect the rays of the Sun upon it, which is a direct proof that the Earth acts as a moon to the Moon, and at opposite periods of the revolution.

III. The Moon always has nearly the same side towards the Earth, which is known by observation. Hence it is inferred, that if the Moon revolves about its axis, its periodical time must be equal to that of its revolution in its orbit round the Earth. This is found to be the case with the fifth satellite of Saturn as it regards its primary.

IV. The Moon appears to have two *librations*, one upon a line perpendicular to its axis, called its libration in latitude; the other upon its axis, called its libration in longitude. This appears also from observation, small portions of the surface of the Moon being visible in some parts, and invisible in other parts of its orbit; that is, in consequence of her *libration in latitude* we sometimes see one pole, and sometimes the other; and, by the *libration in*

longitude, more of the western limb is sometimes seen, and, at others, more of the eastern.

The libration of the Moon is thus explained: we must consider the disk of the Moon, when seen from the centre of the Earth, as terminated by a great circle of the lunar globe, perpendicular to its radius vector, or to a line which joins the centres of the Earth and Moon: on the plane of this great circle, that hemisphere of the Moon which is presented to the Earth is projected, and the various appearances of this hemisphere are connected with the rotatory motion of the Moon on its axis. If this motion did not exist, its radius vector would trace a great circle on its surface, every part of which would be successively turned towards us, during each lunar revolution. But, at the same time that the radius vector would describe this circumference, the Moon, by its revolution, brings very nearly the same point of its surface to the radius, and, consequently, turns the same hemisphere towards the Earth. The inequalities in the Moon's motion produce some slight variation in the appearance of this hemisphere; for, as the motion of rotation does not partake perceptibly of these inequalities, it is variable with respect to the radius vector, which thus intersects its surface at different points. The lunar globe, therefore, makes, with respect to this radius, oscillations corresponding to the inequalities of its motions, which cause some part of its surface to be alternately concealed, and exposed to our observation. This libration, referred to the ecliptic, is called the libration in longitude.

But the Moon has a libration in latitude perpendicular to this, and by which the parts near the poles of the axis of rotation of this globe alternately appear and disappear. Suppose the axis of rotation to be perpendicular to the ecliptic. When the Moon is in its ascending node, these two poles will be at the northern and southern extremity of the visible he-

misphere. In proportion as the Moon is raised above the ecliptic, the northern pole, and the parts surrounding it, will disappear, while the regions near the south pole will become more and more visible, till the Moon, having arrived at its greatest northern latitude, will return again towards the ecliptic. These phenomena will then be reproduced in the reverse order; and when the Moon, having reached its descending node, passes below the ecliptic, the north pole will present the same phenomenon as the southern one had offered.

The axis of rotation of the Moon is not always perpendicular to the ecliptic, and its inclination produces appearances which may be understood by supposing the Moon to move upon the plane of the ecliptic, so that its axis should always remain parallel to itself: it is obvious, that then each pole will be visible during half a revolution of the Moon round the Earth, and invisible during the other half, so that the regions which surround them will be alternately visible and invisible.

V. The inclination of the axis of the Moon to her orbit is less than seven degrees, so that there can be but a small difference in her seasons. It has also been observed, that the Moon's axis being so nearly perpendicular to the ecliptic, the small obliquity of her orbit cannot cause the Sun sensibly to decline from the equator; therefore that the inhabitants of the Moon must devise some method, very different from ours, for ascertaining the length of their year. We know the length of our years by the return of the equinoxes, but these are not discoverable in the Moon, where the days and nights are equal. The Lunarians, it has been conjectured, may, perhaps, measure their year by observing when either of the poles of the Earth begins to be enlightened, and the other to disappear, which happens at our equinoxes; they being conveniently situated for observing large

tracts of land about the poles of the Earth, which, at present, are unknown even to the most experienced of our navigators.

Table of the Sun's Rising and Setting, every 10th Day:

		h.	m.			h.	m.
Saturday	1st, Sun rises	5	34	- Sets		6	26
Tuesday	11th, - - -	5	15	- - -		6	15
Friday	2d, - - -	4	56	- - -		7	4

Table of the Equation of Time, for every 5th Day:

		m.	s.
Saturday	1st, to the time marked on the dial, *add*	4	9
Thursday	6th, - - - - - - - - - - - - -	2	38
Tuesday	11th, - - - - - - - - - - - - -	1	13
Sunday	16th, from time marked on the dial, *subtract*	0	4
Friday	21st, - - - - - - - - - - - - -	1	14
Wednesday	26th, - - - - - - - - - - - - -	2	13

The Sun enters the sign Taurus at 58 m. past 11 at night on the 20th. Mars and Saturn are in conjunction on the 15th, Mars being 18′ south.

The Moon enters her last quarter at 7 m. past 5 in the afternoon on the 1st. The new Moon is at 20 m. past 6 in the afternoon on the 9th. She enters her first quarter on the 16th, at 21 m. past 9 at night; and the Moon is full on the 23d, at 17 m. past 5.

The Moon passes the meridian on the

18th	day at	5 m. past 8	in the evening.
19th	- -	0 - - 9	
20th	- -	52 - - 9	
21st	- -	42 - - 10	
22d	- -	31 - - 11	
23d	- -	20 - - 12	

Table of the Eclipses of Jupiter's first Satellite. The calculations for this month refer to the emersions.

2d	- -	29 m.	after 4 in the morning.
8d	- -	57	- 10 in the evening.
10th	- -	51 - -	12
18th	- -	46 - -	2 in the morning.
19th	- -	14 - -	9 in the evening.
26th	- -	8 - -	1

Mercury's greatest elongation happens on the 14th.

HISTORY OF ASTRONOMY.

[Continued from p. 103.]

From the time of Hipparchus, a century and a half before the Christian æra, to the time of Ptolemy, who flourished in the middle of the second century after the birth of Christ, the science of astronomy seems to have been at a stand. This philosopher, who was born at Ptolemais, in Egypt, continued the plan of Hipparchus in reforming the science of astronomy, and with that view he collected all the scattered materials which history or tradition had saved from the ravages of time. These fragments of antiquity are preserved with his own researches in his Almagest or *Great Composition*, a work which contains a complete system of astronomy, and which continued for many ages to be the elementary work by which the science was taught in every nation of Europe. Ptolemy made many interesting discoveries respecting the astronomy of the Moon: he applied himself with great assiduity to perfect the theory of the planets, by determining, with an accuracy which had never before been attempted, their relative positions and distances from the Earth, and the apparent paths which they described among the fixed stars. Of his theory of the solar system we have given an account in the Introduction to this volume. It does not appear whether we are indebted to Ptolemy or Hipparchus for the methods of computing eclipses contained in the Almagest. The subject of astronomical refractions was first explained by Ptolemy in his Treatise an Optics: this work, which existed in the days of Alhazen the Arabian astronomer, has not been transmitted to our times. He accomplished the proposal of Hipparchus, to collect all the known longitudes and latitudes of places on the Earth; this astronomer also laid the foundation of the method of projections in the formation of geographical charts. The science of chronology, music, optics, and dialling, were all in-

debted to the labours of this universal genius; and sensible of the benefits which he had conferred on science, Ptolemy was anxious to transmit to future ages some durable monument of his labours. He accordingly consecrated in the temple of Serapis at Canopus, an inscription cut on marble, which contained the leading features of the system which he had formed.

The glory of the Alexandrian school departed with the life of Ptolemy, and science was doomed to languish during a long period (several centuries) of inglorious repose. Even in Rome, the metropolis of the world, the seat of learning and civilization, the science of astronomy was completely neglected. Eloquence, poetry, and the fine arts, were the subjects of Roman study, while the heavens were contemplated with indifference. After the division of this mighty empire, and its subsequent overthrow by the hordes of the north, the taste and genius of the Romans began to decline, and literature and the fine arts accompanied science in her fall.

At the beginning of the seventh century of the Christian æra, a mighty revolution agitated the nations of the earth, when Mohammed carried victory and desolation into the powerful kingdoms of the East. Instigated with a desire to propagate their faith, the successors of the Prophet committed the most fatal ravages in Persia, Syria, and Egypt. The Alexandrian library, the treasury of all the wisdom of antiquity, was wantonly burned by the caliph Omar; and though sorrow and repentance followed the savage deed, the precious fruits of antient genius and learning were irrecoverably lost.

When the caliphs of Arabia had reduced under their dominion the western kingdoms of Europe and Africa, their ambition of conquest was amply gratified, and their enthusiasm was directed to more noble objects. The desire of repose and the love of science induced them to return to their country, and

to rekindle those intellectual lights, which, but a century before, their ancestors had been so zealous to extinguish. The revival of astronomy in Arabia commenced in the reign of Almanzor, who not only encouraged but cultivated science. His son, Harun al Rashid, extended to them the same liberal protection, and in an embassy which he sent to Charlemagne in 799, he presented that monarch with an ingenious clepsydra or water clock of very elegant workmanship; but it was not till the reign of Almamon, the youngest son of Al Rashid, that astronomy received any important accessions from the Arabs. This noble-minded prince invited to his capital the most distinguished philosophers of the age; and Christians, Mohammedans, and Jews, were all assembled in the academy which he formed at Bagdad. 'While a war of persecution was raging among the Christians of the West, universal toleration reigned throughout the dominions of Almamon; and the rays of science were gilding the walls of Bagdad, when they had left, in utter darkness, the highest mountains of Europe. Even the force of arms was employed by the Saracen conqueror in the cause of science. One of the conditions of peace which he imposed on the Greek Emperor Michael III was the surrender of all the Greek manuscripts possessed by the emperor of Constantinople.' At this time the Almagest of Ptolemy, which was among the manuscripts, was, by the command of Almamon, translated into the Arabic language, and an original treatise on astronomy, which still exists, was composed under the title of "*Astronomia elaborata a compluribus D. D. jussu Regis Maimon.*" This prince, by means of instruments constructed for the purpose, determined the obliquity of the ecliptic, and employed the ablest geometers to measure a degree of the meridian on the plains of Mesopotamia. During the reign of Almamon, the science of astronomy was cultivated, and its boundaries augmented by Alfraga-

nus, Thebit Ibn Chora, and Albategnius: of these, the first wrote an elementary treatise on sun-dials, and, from the facility with which he performed the most complicated calculations, he received the name of the Calculator. Albategnius was the most considerable Arabian astronomer, and made numerous important observations at Antioch, and at Aracte, a town of Mesopotamia. He found the annual precession of the equinoxes to be 51″. 2, and he determined the obliquity of the ecliptic to be, when corrected by refraction and parallax, 20° 35′ 40″. In addition to these and many other labours, he constructed new astronomical tables for the meridian of Aracte, which were superior in correctness to those of Ptolemy, and were highly esteemed by his successors in science. The works of this learned astronomer were collected in one volume, and published under the title of "*De Scientia et Motibus Stellarum.*" The history of Arabian astronomy terminates with the life of Albategnius; but the spirit of discovery survived, and the sciences of the Arabs were introduced into all countries that were subjected to their power.

Ibn Junis, an Egyptian astronomer, made many interesting observations, that are recorded in a manuscript work of that astronomer which is preserved in the library at Leyden, and which has been published with a translation by Professor Caussin. This work contains 28 observations on solar and lunar eclipses, which were made between the years 829 and 1004; 7 on the equinoxes, made between 830 and 851; an observation on the summer solstice in 832; and three eclipses observed at Cairo, in 977, 8, 9, which go to establish the acceleration of the Moon's motion.

Towards the middle of the eleventh century, the Persians emancipated themselves from the Arabian yoke, and, with their independence, they recovered their taste for astronomy. In 1264 a magnificent observatory was established at Maragha, the capital

of Media: encouraged by this circumstance, crowds of astronomers flocked to the city, and were united into an academy which long flourished in Persia. About this period Nassir-Eddin composed, among other works on astronomy, 'A Treatise on the Theory of Celestial Motions, a Treatise on the Astrolabe, and Astronomical Tables.'

Ulugh-Beigh, a prince of Tartary, grandson of Tamerlane the Great, made a distinguished figure as an astronomical observer. He established a society for the advancement of astronomy, and erected instruments for its use, at Samarcand, the capital of his dominions. He found the obliquity of the ecliptic to be 23° 30′ 20″, and he determined the precession of the equinoxes to be 1° in 70 years. He also formed a new catalogue of fixed stars, and constructed astronomical tables, which were so accurate that they differed but little from those of Tycho Brahe. The observations of Ulugh-Beigh were the last accessions which astronomy received from the East. The iron hand of religious and political despotism had been stretched with fatal effect over the most delightful regions of Asia, and under its deadly pressure the love of science was completely extinguished, and the untried genius of the West was perhaps reserved to advance human knowledge to maturity, and to perfect that fabric of human wisdom which astronomy was destined to form. The study of astronomy was kept alive in Spain by the Arabs, who had established themselves in that country. Arzachel observed the obliquity of the ecliptic, and corrected the theory of the Sun by a series of very accurate observations. Alhazen wrote upon the cause of twilight, and ascertained the height of the earth's atmosphere to be 52 miles; he explained the nature of the refraction of the atmosphere, and the method of determining it.

[To be continued.]

The Naturalist's Diary.

Emblem of life! See changeful APRIL sail
In varying vest along the shadowy skies,
Now bidding summer's softest zephyrs rise;
Anon, recalling winter's stormy gale,
And pouring from the cloud her sudden hail.

SPRING is characterized as the season of the renovation of nature; in which animals and vegetables, excited by the kindly influence of returning warmth, shake off the torpid inaction of winter, and prepare for the continuance and increase of their several species. The vegetable tribes, as more independent and self-provided, lead the way in this progress. The revivicent plants emerge, as soon as the genial showers have softened the ground, in numbers 'beyond the power of botanists to reckon up the tribes.' The opening blossoms and flowers soon call forth from their winter retreats those industrious insects which derive sustenance from their nectareous juices. As the beams of the sun become more potent, the larger vegetables, shrubs, and trees, unfold their leaves; and as soon as a friendly concealment is thus provided for the various nations of the feathered race, they joyfully begin the course of laborious but pleasing occupations, which are to engage them during the whole season.

The *swallow*, which arrives early in this month, is, of all other birds, the most inoffensive, harmless, entertaining and social; all, except one species, attach themselves to our houses, amuse us with their migrations, songs, and marvellous agility, and clear the air of gnats and other troublesome insects, which would, otherwise, much annoy and incommode us. Whoever contemplates the myriads of insects that sport in the sunbeams in a summer's evening in this country, will soon be convinced to what a degree our atmosphere would be choked with them,

were it not for the friendly interposition of the swallow tribe! Swallows are found in every country of the known world, but seldom remain the whole year in the same climate. There are four species of the hirundines that visit England; they arrive in the following order:

1. The chimney swallow (*hirundo rustica*) builds its nest generally in chimnies, in the inside, within a few feet of the top, or under the eaves of houses.

2. The house martin (*hirundo urbica*), known by its white breast and black back, glossed with blue, visits us in great numbers. It builds under the eaves of houses, or close by the sides of the windows.

3. The sand martin (*hirundo riparia*) is the smallest of our swallows, as well as the least numerous of them. It frequents the steep sandy banks in the neighbourhood of rivers, in the sides of which it makes deep holes, and places the nest at the end.

4. The swift (*hirundo apus*) is the largest species, measuring nearly eight inches in length. These birds build their nests in lofty steeples and high towers, and sometimes under the arches of bridges.

To the SWALLOW.

Gentle Herald of the Spring,
Gliding swift on wand'ring wing,
Say from what distant climes returned,
Thou view'st Britannia's realm again,
And, skimming o'er the primrose plain,
Pursu'st, in ecstasy, thine airy flight,
Oft gazing with increased delight
On her fair fields, with softest verdure crowned,
While APRIL spreads his chequered gems around?

Com'st thou from Afric's sultry waste,
To shun her summer's scorching heat;
Where, fiercely gleaming o'er the blasted heath,
The dry Harmatton breathes the gale of death?

Or com'st thou from some secret cave,
Waked from thy long repose,
Where wint'ry winds around thee blew,
And fell the driving snows;
Where storms unheeded rent the troubled air,
While ev'ry field was bleak, and ev'ry tree was bare?

Or sunk beneath the whelming tide,
Could thy feathered form reside,
And, strange to tell! by secret charms,
While Naiads waved their circling arms,
In liquid crystal pass the wint'ry gloom,
Till earth again disgorged her vernal bloom?

DR. SHAW.

The next bird which appears is that sweet warbler, the *motacilla luscinia*, or nightingale. Although the nightingale is common in this country, it never visits the northern parts of our island, and is but seldom seen in the western counties of Devonshire and Cornwall. It leaves us some time in the month of August, and makes its regular return in the beginning of April.

The nightingale has been celebrated as a melancholy bird by the poets, and is exquisitely described as such by Milton, in the most beautiful of all beautiful poems, the *Penseroso*:—

Sweet bird, that shunn'st the noise of folly,
Most musical, most melancholy;
Thee, chantress, oft the woods among
I woo to hear thy evening song.

So great a favourite was this bird with Milton, that he never omits an opportunity of celebrating its powers. What a sweet passage is that, in his fifth book of Paradise Lost, where Eve, relating her dream to Adam, fancies him to have said,

Why sleep'st thou, Eve? now is the pleasant time,
The cool, the silent, save where silence yields
To the sweet night-warbling bird, that now, awake,
Tunes sweetest her love-laboured song.

And again, where the earth and all its animal and feathered inhabitants give signs of gratulation at our parents' nuptials:

Joyous of birds; fresh gales and gentle airs
Whispered it to the woods, and from their wings,
Flung rose, flung odours from the spicy shrub,
Disporting, till the amorous bird of night
Sung spousal, and bid haste the evening star
On his hill top to light the bridal lamp.
These, lulled by nightingales, embracing slept;

And on their naked limbs the flowery roof
Showered roses, which the morn repaired.

So charmed was THOMSON with this aerial music, that he would listen, hour after hour, on a fine summer's evening, to hear the nightingales in Richmond Gardens.

The nightingale, however melancholy as she has been represented, is, in fact, a cheerful bird: she is sorrowful only by name; she sings by day as well as by night, and is, as Martial calls her, the most garrulous of all our singing birds. Her notes, strong and sonorous, wild and mellow, are, to the highest degree, enlivening, when heard at highest noon; and only pensive and melancholy, when all nature is lulled to repose, and our feelings are hushed to silence; when every sound, whether of the woods, the distant chimings of a cathedral, or the rolling of remote waters, come, at intervals, on the ear, and produce nearly the same emotions as the notes of the nightingale herself. It is from association, that she derives most of her powers of disposing the heart to melancholy impressions: cheerful and happy herself, she has, aided by the gloom and silence of night, power to elicit tears from all that listen to her warblings:—like the infant, in an elegant Persian poem of Sadi, she smiles and is happy, while all around her are silent and sad.

The nightingale was the favourite bird of Sophocles and Tasso[1], and the subject of many an Arabic and Persian allegory. Pliny has described the effect of this bird's exquisite note with appropriate warmth; and Walton, a writer of genuine feeling and classical

[1] Odi quello usignuolo,
Che va di ramo in ramo
Cantando, To amo, To amo. AMINTA.

Hear that sweet nightingale,
Who flies from bough to bough,
Singing—I love, I love.

simplicity, has celebrated it in the truest measure of applause:—'He, that at midnight, when the very labourers sleep securely, should hear, as I have heard, the clear air, the sweet descants, the natural rising and falling, the doubling and redoubling of her voice, might well be lifted above earth, and say, "Lord! what music hast thou provided for thy saints in heaven, when thou affordest bad men such music upon earth."'

Of this bird it is curious to remark, that it is not once alluded to by Homer or by Horace, both of whom embrace such a multitude of objects, and draw so copiously from the works of nature; and though the uninterrupted silence which prevails amid the Scottish and Cambrian Glens would afford her all the serenity she could wish, she no where makes their rocks and valleys echo with her notes[1].

What bird so sings, yet so does wail?
Oh! 'tis the ravished *nightingale*,
Jug, jug—jug, jug—tereu, she cries,
And still her woes at midnight rise.

Hark, hark! who is't now we hear?
None but the *lark* so shrill and clear;
Now at heaven's gate she claps her wings,
The morn not waking till she sings.

Hark; hark! with what a pretty throat
Poor Robin *red-breast* tunes his note!
Hark how the jolly *cuckoos* sing
Cuc-koo, to welcome in the spring[2].

That beautiful little bird, the wryneck (*jynx torquilla*), makes its appearance about the middle of the month, preceding the cuckoo by a few days. Its

[1] See the Philosophy of Nature, vol. i, p. 69-76. To this work we cheerfully acknowledge our obligations, both in our former and present volume. It is one of the most delightful and elegantly written books which modern times have produced. For further remarks on the nightingale, see T. T. for 1814, p. 100, 101. See also Vincent Bourne's 'Strada Philomela,' translated by Cowper, in Hayley's Life, vol. iv, p. 370.

[2] This pretty song, by John Lylie, is extracted from Ellis's Specimens, vol. ii, p. 241.

food consists of ants and other insects, of which it finds great abundance lodged in the bark and crevices of trees. The structure of this bird's tongue is very remarkable; it is of considerable length, of a cylindrical form, and capable of being pushed forwards, and drawn into its bill again; it is furnished with a horny substance at the end, with which it secures its prey, and brings it to its mouth.

The well known cry of the cuckoo (*cuculus canorus*) is heard soon after the wryneck, and ceases the latter end of June; its stay is short, the old cuckoos being said to quit this country early in July. Cuckoos build no nest, and what is more extraordinary, the female deposits her solitary egg in the nest of another bird, by whom it is hatched. The nest she chooses for this purpose is generally the hedge-sparrow's, though she occasionally resorts to that of the water-wagtail, titlark, &c.

Hail, beauteous stranger of the grove!
Thou messenger of spring!
Now heaven repairs thy rural seat,
And woods thy welcome ring.
What time the daisy decks the green,
Thy certain voice we hear;
Hast thou a star to guide thy path,
Or mark the rolling year?
Delightful visitant! with thee
I hail the time of flowers;
And hear the sound of music sweet
From birds among the bowers.
What time the pea puts on the bloom,
Thou fliest thy vocal vale;
An annual guest in other lands,
Another spring to hail.
Sweet bird! thy bower is ever green,
Thy sky is ever clear;
Thou hast no sorrow in thy song,
No winter in thy year[1].

The other summer-birds of passage which arrive

[1] See also Shakspeare's beautiful song in "Love's Labour Lost," 'When daisies pied and violets blue,' &c.

this month, make their appearance in the following order: the ring-ousel (*turdus torquatus*); the red start (*motacilla phœnicurus*), frequenting old walls and ruinous edifices; the yellow wren (*motacilla trochilus*); the swift, already noticed; the whitethroat (*motacilla sylva*); the grass-hopper lark (*alauda trivialis*), the smallest of the lark kind; and, lastly, the willow wren, which frequents hedges and shrubberies, and feeds on insects, in search of which it is continually running up and down small branches of trees.

As a devourer of pernicious insects, one of the most useful birds is the house wren. This little bird seems peculiarly fond of the society of man, and it must be confessed that it is often protected by his interested care. It has long been a custom, in many parts of the country, to fix a small box at the end of a long pole, in gardens, about houses, &c. as a place for it to build in: in these boxes they build and hatch their young. When the young are hatched, the parent birds feed them with a variety of different insects, particularly such as are injurious in gardens. An intelligent gentleman was at the trouble to observe the number of times a pair of these birds came from their box, and returned with insects for their young. He found that they did this from forty to sixty times in an hour; and, in one particular hour, the birds carried food to their young seventy-one times. In this business they were engaged the greater part of the day; say twelve hours. Taking the medium, therefore, of fifty times in an hour, it appeared that a single pair of these birds took from the cabbage, salad, beans, peas, and other vegetables in the garden, at least, six hundred insects in the course of one day. This calculation proceeds upon the supposition, that the two birds took only a single insect each time; but it is highly probable they often took several at a time.

The tenants of the air, are, in this month, busily employed in forming their temporary habitations, and

in rearing and maintaining their offspring. Their mode of building, the materials they use, as well as the situations they select, are as various as the different kinds of birds, and are all admirably adapted to their several wants and necessities.

The instinct and industry of birds are in nothing more apparent than in the building of their nests. How regular and admirable are these little edifices, formed of such different materials, collected and arranged with such judgment and labour, and constructed with such elegance and neatness, without any other tools than a beak and two feet!

> It wins my admiration,
> To view the structure of that little work,
> *A bird's nest.* Mark it well within, without.
> No tool had he that wrought, no knife to cut,
> No nail to fix, no bodkin to insert,
> No glue to join: his little beak was all,
> And yet now neatly finished! What nice hand,
> With every implement and means of art,
> And twenty years apprenticeship to boot,
> Could make me such another? Fondly then
> We boast of excellence, whose noblest skill
> Instinctive genius foils.

Instinctive ingenuity is apparent in all their nests. But the extraordinary subtlety of the long-tailed titmouse deserves particular admiration. With great art, she builds her nest with moss, hair, and the webs of spiders, cast out from them when they take their flights, with which the materials are strongly tied together. Having neatly built and covered her nest with these materials, she thatches it on the top with the *muscus arboreus ramosus*, or such like broad whitish moss, to keep out rain, and to deceive the eye of any one that might pass near it. The interior part she lines with a great number of small feathers; 'with so many,' says Mr. Derham, 'that I confess I could not but admire how so small a room could hold them; especially, that they could be laid so close and handsomely together, to afford sufficient

room for a bird with so long a tail, and so numerous an issue as this bird commonly hath.

The unerring instinct which guides every species of the feathered race, in contriving the most proper habitation for the hatching of their young, instructs them also to repair to the situation the most suitable for them, with respect to their food, their pleasure, and their safety. Hence, the choice of each species is invariably the same. Some repair to the rude thicket; some to the cleft or hollow-tree. Some weave their humble nests in the grassy dale, or roughening waste. Others delight in shaggy banks, in woodland solitudes, and unfrequented glooms. Some build in the towering tree, or inaccessible rock; and others prefer the vicinity of man, and take shelter in his chimnies, or in his hospitable caves.

But who the various nations can declare
That plough with busy wing the peopled air?
These cleave the crumbling bark for insect food;
Those dip the crooked beak in kindred blood;
Some haunt the rushy moor, the lonely woods;
Some bathe their silver plumage in the floods;
Some fly to man, his household gods implore,
And gather round his hospitable door,
Wait the known call, and find protection there
From all the lesser tyrants of the air.
The tawny eagle seats his callow brood
High on the cliff, and feasts his young with blood.
On Snowdon's rocks, or Orkney's wide domain,
Whose bleeting cliffs o'erhang the western main,
The royal bird his lonely kingdom forms
Amid the gathering clouds and sullen storms:
Through the wide waste of air he darts his sight,
And holds his sounding pinions poised for flight;
With cruel eye premeditates the war,
And marks his destined victim from afar:
Descending in a whirlwind to the ground,
His pinions like the rush of waters sound;
The fairest of the fold he bears away,
And to his nest compels the struggling prey.

BARBAULD.

Although sparrows, in general, construct their nests under the tiles of houses, or in holes in the

walls, some build them on the tops of trees. This difference of situation affords them an opportunity of exhibiting a singular instance of instinctive sagacity. In the nests built on trees they form an artificial roof, which covers the nest, and prevents the entrance of rain; forming, at the same time, an opening under it: on the contrary, when they build under cover, they abstain from this work of supererogation. 'Instinct,' says the celebrated Buffon, 'is manifested, in this case, in a manner nearly analogous to reason; as it supposes, at least, the comparing together of two ideas. In the little race,' he adds, 'there is a diversity of manners, and a more varied and perfected instinct than in most other birds.'—This improvement he ascribes to their frequenting human society. They are in part domesticated, but without being subjected to it, or losing their independence. From this society they draw whatever suits their convenience, and in it they acquire that subtlety, circumspection, and improvement of the instinctive faculty, which is exhibited in the great variety of their habits, relative to different situations, seasons, and other circumstances.

From the consideration of the providential care so evidently manifested in the preservation of the aërial tribes, the Divine Teacher of our holy religion has drawn an argument, to prevent our sinking into anxiety and despondence, and to induce us to rely with filial confidence and piety in the goodness of our heavenly Parent: '*Are not five sparrows sold for two farthings, and not one of them is forgotten before God? Fear not, therefore, ye are of more value than many sparrows. Behold the fowls of the air: for they sow not, neither do they reap, nor gather into barns; yet your heavenly Father feedeth them. Are ye not much better than they?*—Luke xii, 6, 7.

Behold, and look away your low despair!
See the light tenants of the barren air:

To them, nor stores nor granaries belong;
Nought, but the woodland, and the pleasing song;
Yet, your kind heavenly Father bends his eye
On the least wing that flits along the sky.
To Him they sing, when Spring renews the plain,
To Him they cry in Winter's pinching reign;
Nor is their music or their plaint in vain:
He hears the gay and the distressful call,
And with unsparing bounty fills them all.
If, ceaseless, then the fowls of heaven he feeds,
If o'er the fields such lucid robes he spreads;
Will He not care for you, ye faithless, say?
Is He unwise? or, are ye less than they? THOMSON.

About the middle of this month, the bittern *(ardea stellaris)*

——— *booms* along the sounding marsh,
Mixt with the cries of Heron and Mallard harsh.

This hollow *booming* noise is made during the night in the breeding season, from its swampy retreats. Towards the end of the month, the black-cap *(motacilla atricapilla)* begins its song. This bird has usually a full, sweet, deep, loud, and wild pipe; yet the strain is of short continuance, and its motions desultory. In Norfolk the black-cap is termed the mock-nightingale.

In this month, the blossoms of trees present to the eye a most agreeable spectacle, particularly in those counties which abound with orchards. The black-thorn *(prunus spinosa)* is the first that puts forth its flowers; a host of others follow, among which may be named the ash *(fraxinus excelsior)*, ground-ivy *(glecoma hederacea)*, the box-tree *(buxus sempervirens)*, the pear-tree *(pyrus communis)*, the apricot, the peach, nectarine, the wild and garden cherry[z],

[z] *To* CHERRY BLOSSOMS.

Ye may simper, blush and smile,
And perfume the air awhile;
But, sweet things, ye must be gone;
Fruit, ye know, is coming on.
Then, ah then, where is your grace,
When as cherries come in place?

and the plum; gooseberry and currant-trees; the hawthorn (*cratægus oxycantha*), the apple-tree (*pyrus-malus sativus*), and the sycamore (*acer pseudo-platanus*). These elegant blossoms, while they yield the most exquisite delight to the fervent admirer of the beauties of nature, afford to the moralist a never-failing source of the most pleasing reflections[1].

The elm (*ulmus campestris*), the beech (*fagus sylvatica*), and the larch (*pinus-larix rubra*), are now in *full leaf*. Many and lovely are the flowers which are showered, in profusion, from the lap of April:

The *jonquil* loads with potent breath the air,
And rich in golden glory nods; there too,
Child of the wind, *anemoné* delights;
Or, in its scarlet robe of various dies,
Ranunculus, reflecting every ray;
The *polyanthus*, and with prudent head
The *crown imperial*, ever bent on earth,
Favouring her secret rites and pearly sweets. BIDLAKE.

Other flowers which adorn our fields, at this time, are the checquered daffodil[2] (*fritillaria meleagris*);

[1] See this beautifully exemplified in an elegant little poem by Herrick, in T.T. for 1814, p. 105.

[2] *To* DAFFODILS.

Fair daffodils, we weep to see
You haste away so soon;
As yet the early-rising sun
Has not attained his noon:
Stay, stay,
Until the hast'ning day
Has run
But to the evensong;
And, having prayed together, we
Will go with you along!

We have short time to stay, as you;
We have as short a spring,
As quick a growth to meet decay,
As you, or any thing:
We die
As your hours do; and dry
Away

the primrose; the cowslip (*primula veris*); the cuckoo flower (*cardamine pratensis*); and the harebell (*hyacinthus non scriptus*). The yellow star of Bethlehem (*ornithogalum luteum*) in woods; the vernal squill (*scilla verna*) among maritime rocks; and the wood sorrel (*oxalis acetosella*), are now in full flower.

The progress of vegetation is general and rapid in this month. The *sensation* of plants has given rise to much discussion. While some have ranked the vegetable world with a higher order of nature's products, and have, like Darwin, subjected them to the passions and the pursuits of human beings, others assert that there is an invincible barrier between the mineral, the vegetable, the animal, and the intellectual worlds. For what benefit (say they, rather presumptuously, perhaps) would arise to the creation, by communicating to plants the faculty of animal sensation, or an attenuated intellect? Why should a vegetable be capable of knowing other vegetables, or indulging in the mutual sympathies of pleasure and pain? *Is it not sufficient*, that they can attract the air, the light, and the juices, which nourish them, *after the manner of plants*, and administer by their beauty, by their medicinal and nutritious qualities, to the pleasure, the health, the food of man, and the other members of the animal creation[1]?

In stating the arguments for *sensation* in vegetables, we assume, as a primary position, that vitality, as the result of a particular structure of organized parts, and as implying the faculty of reproducing

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Like to the summer's rain,
Or, as the pearls of morning dew,
Ne'er to be found again. HERRICK.

[1] See these arguments pursued, and experiments adduced in favour of this hypothesis, in Mr. Knight's paper on the Motions of Tendrils of Plants, in *Phil. Tran.* Part II, 1812. See, also, *Retrospect*, vol. viii, p. 217 (No. XXXIV).

a structure similar to itself, is an attribute of the vegetable as well as of the animal kingdom;—but we are, at the same time, perfectly aware of the futility of those lines of demarcation which have been too rashly alledged to discriminate these two grand departments of organized existence; and it must, we think, be admitted, that the transition from the animal to the plant is effected by shades so imperceptible, that it is difficult, and perhaps impossible, to determine what are those beings which actually form the last link in the scale of animated existence, and the first in that of vegetables. Those who argue for the *probability of sensation* in vegetables, support their reasonings not only by the general analogies which may be traced between animals and plants, but also by adverting to other phenomena; some of which refer to certain powers of motion that particular species of plants are observed to possess even in a more eminent degree than the inferior orders of animals, 'several species of which are also destitute of *all* locomotive power.' The existence of these attributes, however, does not necessarily imply *volition*; which denotes a mental faculty associated with other qualities, and a power of deliberation and choice exerted on particular occasions. The aptitude and propensity of plants to incline to the light,—the power exhibited by the climbing sorts in moving and turning their stems, branches, or tendrils,—the direction assumed by the roots of trees, and many other vegetables, in quest of proper nourishment, &c., are referred, by a late writer[1] on this subject, to spontaneous motion or exertion.

'Aquatic plants (observes Mr. Tupper) furnish some curious examples of spontaneous motion strongly characteristic of instinct. Among these, the *water-*

[1] See Mr. Tupper's ingenious and well-written Essay 'On the Probability of Sensation in Vegetables,' lately published by White and Co. See, also, Monthly Review for May 1814, vol. lxxiv, p. 45.

lily affords a very remarkable instance, and that too connected with the reproduction of its species. This plant bears its flowers upon a footstalk under water; and when the flowering season arrives, the stalk rises perpendicularly without any regard to the stream, until the flowers reach above the surface of the water. At this time some of them expand, and then the antheræ discharge their fecundating dust upon the stigma. About four o'clock in the afternoon the expanded flowers close, and the footstalk lies down either upon or under the water. It is erected every day until the flower has been fully impregnated, when it once more sinks under water, and there remains to ripen its seeds, which, at a proper time, escape from the fruit, and give birth to new individuals.

'This is asserted by Linnæus, and various other naturalists; and, though controverted by some, has been recently confirmed by the observations of Dr. Smith, who authorizes me to use his name on this occasion. In cold or shady weather this phenomenon is less evident, and is explained by the writer last named as entirely owing to the stimulus of light. But yet, I presume, it is also in part referable to instinct, and that light operates only as an auxiliary to that phenomenon.'

What is termed the *sleep of plants* and flowers, may be adduced as a striking example of instinctive action in vegetables, or as a proof that they are endued with the power of *self-motion*, which contributes to their well-being, and may therefore be fairly supposed to partake as much of the nature of instinctive action, or to be as necessarily the adjunct of sensation, in the vegetable as in the animal being. Moreover, as, in certain animals, the absence of locomotive power is no criterion of the want of sensation, neither, in vegetables, ought it to be urged against the existence of sensation in them. In short, if any species of living being, from man down to the most humble plant, be destitute of the locomotive power, it is

because all the important purposes of welfare and preservation, for which it is given to others, are fully answered without it.

Instinct, volition, and locomotive power, are considered, by Mr. Tupper, as distinct attributes; 'inasmuch,' he says, 'as *instinct* may exist *independently* of the other *two*, and the *locomotive power*, *independently of volition*. Indeed, if we attend to the particular character of the locomotive faculty in many animals, it is evident that the exertion of this power is merely instinctive, though it is not a necessary adjunct either of instinct or of sensation. But, at the same time (observes our author), I apprehend that sensation is necessarily associated with the instinctive faculty, although the former, like the latter, may exist independently both of volition and of the locomotive power; and, perhaps, we refuse to admit the existence of sensation in vegatables, under the idea that it is connected with the exercise of intellectual powers, which we cannot suppose to appertain to this class of beings.' Mere sensitive power, it is well remarked, does not necessarily imply a thinking and reasoning mind, and may therefore belong to the lowest orders of animals, and to plants.

In reply to the question, *In what particular manner do vegetables feel themselves affected in consequence of any impression which they may receive?* it is observed, that the difference between the sentient organs of plants and our own, precludes us from forming any idea of the particular kind of pleasure or pain which a plant may experience; although we may distinguish in its appearance by which of the two it is affected; as a drooping aspect, for example, evinces pain and uneasiness, while a healthy and vigorous air denotes the enjoyment of well-being.

Another argument, which has been stated against the existence of sensation in vegetables, is deduced from the goodness of the Deity; who, it is urged, would never bestow feeling on beings so much ex-

posed to the depredations of animals, and various other injuries. The answer to such an objection is obvious; that the same reasoning would more forcibly maintain the non-existence of sensation in animals which prey on one another, and which are likewise exposed to innumerable accidents and injuries. We have seldom seen this view of the subject treated in a more impressive and becoming manner than in the pages of the present Essay, though the passage to which we allude to is too long for our quotation.—Lastly, many vegetable actions, and the means of defence with which plants are furnished, as prickles, stings, effluvia, &c., would lead us to infer that they are, moreover, endued with the principle of self-preservation.

'From this general view of the subject, it is evident that animals and vegetables reciprocally tend to the maintenance of a due balance of life through the whole creation; and the particular manner in which this is accomplished is one of those circumstances attending the institutions of nature, which cannot fail to convince us of the existence of a superintendent Providence. If there were not a check to the destruction of living beings, as well as to their undue increase, some of the species would soon be exterminated: and if there were a chasm formed in consequence of the extinction of even the most insignificant species, the whole system would be thrown into confusion; all order would be at an end; and man himself would be at last incapable of resisting this seemingly trifling shock, and the whole living creation would soon be annihilated.

'We must also bear in mind, that although the means of defence which nature has given to animals and vegetables may not prove always effectual for their individual preservation, yet millions of them go through the natural course of their existence, without having suffered from the depredations of their enemies. And even those individuals which fall a

sacrifice to the wants or the appetites of others, have, for the most part, enjoyed that portion of existence allotted to them, and experienced every degree of happiness of which their nature is capable.

'The microscope has discovered to us an innumerable multitude of beings, of whose existence we had no idea before; and though legions of these are daily devoured by the innumerable tribes of other animals that feed on the vegetables or fluids where these diminutive creatures abound; yet, can we reasonably imagine that such a profusion of living beings exists without enjoyment? Or, shall we suppose that sensation has been bestowed on them merely to swell the catalogue of sufferings and multiply the sum of misery in the animal world?—Such an idea is as revolting to reason, as it is incompatible with the infinite goodness of "NATURE's GOD." We may, therefore, confidently believe that these diminutive beings have their season of enjoyment, as well as the enormous Leviathan, although, perhaps, only a few hours encircle the whole course of their appointed existence!

'How infinite, then, is that POWER who could organize such an atom of matter, and give it life and motion!—and how transcendent in goodness, to endue it also with the means of enjoying its existence! And surely, that Being, by whom such things can be effected, can likewise bestow on vegetables a capacity to enjoy their own state of life; and by which, too, the sum of happiness in the universe will be abundantly multiplied!'

In April, the cow-keepers cut the crow-waterfoot (*ranunculus aquatilis*) for their cattle. The growth of this plant is singular. In ponds, and other still water, the submersed leaves, which are capillary, grow in an upright direction, and are of no great length; but, in rapid streams, they are borne along by the current, and, taking root at each joint, frequently extend to the length of several feet. Cattle

eat, with avidity, the water-crowfoot when grown in clear streams; but such as is produced in ponds, or muddy places, they invariably refuse.

Various kinds of insects are seen 'sporting in the sun-beams,' and 'living their little hour.' The jumping spider (*aranea scenica*) is seen on garden walls; and the webs of other species of spiders are found on the bushes, palings, and outsides of houses; the *iulus terrestris* appears, and, early in the month, the death-watch (*termes pulsatorius*) beats. If any one tap gently with his nail, or a pen, near the place where one of these insects is stationed, it will generally answer him by beating in return.

About this time the wood-ant (*formica herculanea*) begins to construct its nest, and the shell-snail comes out in troops: the number of these, however, varies according to the severity of the winter and the depredations committed upon them by the thrushes. These birds hunt out their hiding-places, and, dragging them forth, beat them against some stone, or hard substance, until they break the shells in pieces, by which means they are enabled to get at, and devour, the animals.

> To grass, or leaf, or fruit, or wall,
> The snail sticks close, nor fears to fall,
> As if he grew there, house and all
> Together.

The stinging-fly (*conops calcitrans*), and the red ant (*formica rubra*), now appear. The mole-cricket (*gryllus gryllotalpa*) is the most remarkable of the insect tribe seen about this time. It measures more than two inches in length, and burrows under ground in the manner of a mole. The black slug (*limax ater*) abounds at this season. The blue flesh-fly (*musca vomitoria*), the cabbage butterfly (*papilio brassicæ*), and the dragon-fly (*libellula*), are frequently observed towards the end of the month. The great variegated *libellula* (*libellula varia* of Shaw), which

appears, *principally*, towards the decline of summer, is an animal of singular beauty: its general length is about three inches from head to tail, and the wings, when expanded, measure nearly four inches from tip to tip.

Fish, in quest of food, leave their winter retreats, and again become the prey of the angler.

Dry weather is still acceptable to the farmer, who is employed in sowing various kinds of grain, and seeds for fodder, as buck-wheat, lucerne, saintfoin, clover, &c. The young corn and springing-grass, however, are materially benefited by occasional showers.

On the Migration of Birds.

[Continued from p. 106.]

The birds of passage are all peculiarly accommodated, by the structure of their parts, for long flights; and it is remarked, that, in their migrations, they observe a wonderful order and polity: they fly in troops, and steer their course, without the aid of the compass, to vast and unknown regions. The flight of the wild geese in a wedge-like figure has been often observed; to which it is added, by the natural historian of Norway, that the three foremost, who are the soonest tired, retreat behind, and are relieved by others, who are again succeeded by the rest in order. But this circumstance had been observed, many ages before, by Pliny, who describes certain birds of passage flying in the form of a wedge, and spreading wider and wider; those behind resting upon those before, till the leaders, being tired, are, in their turn, received into the rear. 'Wild ducks and cranes,' says the Abbé de la Pluche, 'fly, at the approach of winter, in quest of more favourable climates. They all assemble at a certain day, like swallows and quails. They decamp at the same time, and it is very agreeable to observe their flight. They

generally range themselves in a long column like an I, or in two lines united in a point like a V reversed.' And thus, as Milton says,

——— ranged in figure wedge the way.

'The duck or quail, that forms the point,' adds the Abbé, 'cuts the air, and facilitates a passage to those that follow: but he is charged with this commission only for a certain time, at the conclusion of which he wheels into the rear, and another takes his post.' And thus again, as Milton observes,

——— with mutual wing
Easing their flight.

It has been observed of the storks, that, for about the space of a fortnight before they pass from one country to another, they constantly resort together, from all the circumjacent parts, to a certain plain, and there, forming themselves once every day into a *deu-wanne* (according to the phrase of the people), are said to determine the exact time of their departure, and the places of their future abode.

Where the Rhine loses his majestic force
In Belgian plains, won from the raging deep,
By diligence amazing, and the strong
Unconquerable hand of Liberty,
The stork-assembly meets: for many a day,
Consulting deep, and various, ere they take
Their arduous voyage through the liquid sky.
And now their route designed, their leaders chose,
Their tribes adjusted, cleaned their vigorous wings;
And many a circle, many a short essay,
Wheeled round and round, in congregation full
The figured flight ascends; and, riding high
The aërial billows, mixes with the clouds. THOMSON.

Mr. Biberg, an ingenious naturalist of Sweden, has observed, that 'the starling, finding, after the middle of summer, that worms are less plentiful in that country, goes annually into Germany and Denmark. The female chaffinches, every winter, about Michaelmas, go in flocks to Holland; but as the males stay in Sweden, the females come back

the next spring, except such as choose to breed no more. In the same manner, the female Carolina yellow-hammer, in the month of September, while the rice on which she feeds is laid up in granaries, goes towards the south, and returns in the spring to seek her mate. Our aquatic birds,' continues Mr. Biberg, 'are forced by necessity to fly towards the south every autumn, before the water is frozen. Thus we know, that the lakes of Poland and Lithuania are filled with swans and geese every autumn, at which time they go in great flocks, along many rivers, as far as the Euxine sea. But, in the beginning of spring, as soon as the heat of the sun molests them, they return back, and go again to the northern ponds and lakes, in order to lay their eggs. For there, and especially in Lapland, there is a vast abundance of gnats, which afford them excellent nourishment, as all of this kind live in the water before they get their wings.'—Mr. Biberg proceeds to enumerate many other birds that migrate to different regions; and he then adds: 'By these migrations, birds become useful to many different countries, and are distributed over almost all the globe; and I cannot here forbear expressing my admiration, that all of them exactly observe the times of coming and going, and that they never mistake their way.' *(See this subject further pursued in the Naturalist's Diary for September.)*

MAY.

MAY is so called from *Maia*, the mother of Mercury, to whom sacrifices were offered by the Romans on the first of this month; or, according to some, from respect to the senators and nobles of Rome, who were named *Majores*, as the following month was termed Junius, in honour of the youth of Rome.

The Saxons called May, *tri-milki*, because, in that month, they began to milk their kine three times in the day.

Remarkable Days.

1.—MAY-DAY.

In the north of England, May-Day still retains some of its antient sports. The young people of both sexes go out early in the morning of the first of May (observes Mr. Hutchinson) to gather the flowering thorns and the dew of the grass, which they bring home with music and acclamations; and having dressed a pole on the town-green with garlands, dance around it. The dew was considered as a grand cosmetic, and preserved the face from wrinkles and the traces of old age; the happiest gift Flora could bestow on her votaries. It seems from these remains, that this festival was introduced by the Romans, who observed it in honour of Flora. What particular rites originally attended it with that people, we shall not inquire; at present it is celebrated only with mirth, innocence, and love.

The Druids, who were the priests of the God of nature, and celebrated every remarkable period in the change of the seasons, left a memorial of their religious rites on this day, very different from those instituted in honour of the celebrated divinity Flora; that is, a Bel-tein rural sacrifice. It is to be traced in the mountainous and uncultivated parts of Cumberland, among the Cheviots, and in many parts of Scotland. Mr. Pennant gives a particular description of it in his Tour in Scotland: 'On the first of May, in the Highlands of Scotland, the herdsmen of every village hold their Beltein: they cut a square trench in the ground, leaving the turf in the middle; on that they make a fire of wood, on which they dress a large caudle of eggs, butter, oatmeal, and milk, and bring, besides the ingredients of the caudle, plenty of beer and wisky, for each of the company must con-

tribute something. The rites begin with spilling some of the caudle on the ground, by way of libation; on that every one takes a cake of oatmeal, upon which are raised nine square knobs, each dedicated to some particular being, the supposed preserver of their flocks and herds, or to some particular animal, the real destroyer of them: each person then turns his face to the fire, breaks off a knob, and, flinging it over his shoulder, says, This I give to thee, preserve thou my horses; this I give to thee, preserve thou my sheep; and so on. After that, they use the same ceremony to the noxious animals: this I give to thee, O fox! spare thou my lambs; this to thee, O hooded crow! this to thee, eagle! When the ceremony is over, they dine on the caudle,' &c.

Something of this kind is retained (in Northumberland) in the syllabub prepared for the May feast, which is made of warm milk from the cow, sweet cake, and wine; and a kind of divination is practised, by fishing with a ladle for a wedding ring, which is dropped into it for the purpose of prognosticating who shall be first married.

Mr. Brand, in his Observations on Bourne's XXVth chap., makes several quotations from a pamphlet, entitled '*The way to things by words, and to words by things.*' He says, 'We gather from him that our ancestors held an anniversary assembly on May-day; the *Column of May* (whence our may-pole) was the great standard of justice in the *Ey-commons* or fields of May. Here it was that people, if they saw cause, deposed or punished their govenors, their barons, their kings. The garland, or crown, when hung on the top of the *may* or pole, was the great signal for convening the people. This was one of the antientest customs which, from the remotest ages, has been, by repetition, from year to year perpetuated.' 'It was considered as the boundary day that divided the confines of winter and summer, allusively to which, there was instituted a sportful war between two par-

ties; the one in defence of the continuance of winter, the other for bringing in the summer. The youth were divided into troops, the one in winter livery, the other in the gay habit of the spring. The mock battle was always fought booty; the spring was sure to obtain the victory, which they celebrated by carrying triumphally green branches with May flowers, proclaiming and singing the song of joy, of which the burthen was in these or equivalent terms:—'We have brought the summer home.'

HERRICK has given us some idea of the manner in which this day was once kept, in his beautiful little poem of '*Corinna's going a Maying.*'

Get up, get up for shame; the blooming morn
Upon her wings presents the God unshorn:
See how Aurora throws her fair
Fresh-quilted colours through the air:
Get up, sweet slug-a-bed, and see
The dew bespangling herb and tree:
Each flow'r has wept, and bowed toward the east,
Above an hour since; yet you not drest;
Nay, not so much as out of bed;
When all the birds have matins said,
And sung their thankful hymns: 'tis sin,
Nay, profanation to keep in;
When as a thousand virgins on this day,
Spring sooner than the lark to fetch in May!

Rise, and put on your foliage, and be seen
To come forth, like the spring time, fresh and green,
And sweet as Flora. Take no care
For jewels for your gown or hair:
Fear not, the leaves will strew
Gems in abundance upon you:
Besides, the childhood of the day has kept,
Against you come, some orient pearls unwept:
Come, and receive them, while the light
Hangs on the dew-locks of the night,
And Titan on the eastern hill
Retires himself, or else stands still
Till you come forth. Wash, dress, be brief in praying;
Few beads are best, when once we go a Maying!

Come, my Corinna, come; and, coming, mark
How each field turns a street, each street a park

Made green, and trimmed with trees; see how
Devotion gives each house a bough,
Or branch; each porch, each door, ere this,
An ark, a tabernacle is,
Made up of whitethorn neatly interwove,
As if here were those cooler shades of love.
Can such delights be in the street,
And open fields, and we not see't?
Come, we'll abroad; and let's obey
The proclamation made for May,
And sin no more, as we have done, by staying;
But, my Corinna, come, let's go a Maying!

There's not a budding boy or girl, this day,
But is got up, and gone to bring in May:
A deal of youth, ere this, is come
Back, and with whitethorn laden home:
Some have despatched their cakes and cream,
Before that we have left to dream;
And some have wept, and wooed, and plighted troth,
And chose their priest, ere we can cast off sloth:
Many a green gown has been given;
Many a kiss, both odd and even;
Many a glance, too, has been sent
From out the eye, love's firmament;
Many a jest told of the keys betraying
This night, and locks picked; yet we're not a Maying!

Come, let us go, while we are in our prime,
And take the harmless folly of the time;
We shall grow old apace, and die
Before we know our liberty;
Our life is short, and our days run
As fast away as does the sun:
And as a vapour, or a drop of rain
Once lost, can ne'er be found again,
So when or you, or I are made
A fable, song, or fleeting shade;
All love, all liking, all delight
Lies drowned with us in endless night.
Then, while time serves, and we are but decaying,
Come, my Corinna, come, let's go a Maying!

1.—SAINT PHILIP *and* SAINT JAMES THE LESS.

Philip was born at Bethsaida, near the sea of Tiberias, the city of Andrew and Peter. Of his pa-

rents and trade the Gospel takes no notice; though he was, most probably, a fisherman. He was one of the first disciples, and an apostle. *John* i, 43-47.

James the Less, called also *James the Just*, and by the apostle, *Paul James*, the Lord's brother, *Gal.* i, 19, was the son of Joseph, afterwards husband to the Virgin Mary, as is probable by his first wife. Hence the blessed Virgin is called Mary, the mother of James and Joses. *Matt.* xxviii, 56. And by *Mark*, chap. xv, 40, the mother of James the Less, and of Joses, and of Salome; and the same person is called the mother of Jesus, *John* xix, 25.

The first of these martyrs was stoned to death, and the second, having been thrown from a high place, was killed by a fuller's staff.

The *Jews* commemorate the death of Samuel the Prophet, by a general mourning, on the 1st of May.

3.—INVENTION OF THE CROSS.

The Romish Church celebrates this day as a festival, to commemorate the *invention* or finding of the *cross*. Helena, the mother of Constantine the Great, being warned in a dream to search for the cross of Christ at Jerusalem, went thither, and employed many days at Golgotha in digging for it. After opening the ground to a great depth, she found *three crosses*, which Helena concluded were the crosses of our Saviour and the two malefactors who were crucified with him. Being at a loss, however, to ascertain which was the real cross of Christ, she ordered them all to be applied to a dead person. Two of them, as the legend relates, had no effect; but the third raised the corpse to life, which was not only a probable sign, but an absolute demonstration to *Helena*, that *that* was the *cross* she so diligently sought. No sooner was the secret discovered, than every one was anxious to procure a piece of it; so great was this desire, that in the time of Paulinus, a disciple of St. Ambrose, and Bishop of Nola, in the year 420,

there were more reliques of the cross than there was of the original wood. And that venerable father asserts, that it was miraculously augmented: 'It very kindly afforded,' says he, 'wood to men's importunate desires, without any loss of its substance.'

This day is kept by the *Jews* in commemoration of the death of Miriam, the sister of Moses; as, after which, the supply of water in the wilderness was stopped till Moses smote the rock.

4.—ASCENSION DAY.

From the earliest times, this day was set apart to commemorate our Saviour's ascension into heaven: all processions on this, and the preceding rogation days, were abolished at the reformation. In London, on this day, the minister, accompanied by the churchwardens, and a number of boys, with wands, walk in procession, and *beat the bounds* of the parish. But this is not always practised, nor in every year.

6.—JOHN EVANGELIST, A.P.L.

John the Evangelist, so called from the Greek term Εὐάγγελος, the messenger of glad tidings, was a Galilean by birth, the son of Zebedee and Salome, the younger brother of James, but not of him that was surnamed the Just, and who was the brother of our Lord. His brother James and he were surnamed by Jesus, the *Sons of Thunder*, meaning the principal ministers of the gospel, and John was more endeared to him than any of his disciples. He was condemned to be thrown into a cask of burning oil, Ante Port. Lat., before the gate of Latina; hence the letters added to his name. He lived to the reign of Trajan, and died about 90 years of age.

14.—WHIT-SUNDAY.

On Whit-Sunday, or *White-Sunday*, the *catechumens*, who were then baptized, as well as those who had been baptized before at Easter, appeared, in the antient church, in *white garments*. The Greeks, for the same reason, call it *Bright Sunday*; on account of the number of bright white garments which were

then worn. The name of this Sunday, in the old Latin church, was *Dominica in Albis*, as was the Sunday next after Easter, on the same occasion. On this day, the Holy Ghost descended upon the apostles and other Christians in the visible appearance of fiery tongues.

The celebration of divine service in St. Peter's church at Rome, on Whitsunday, is thus described by Mr. Eustace[1].

"The great or middle doors of the church are thrown open at ten, and the procession, preceded by a beadle carrying the papal cross, and two others bearing lighted torches, enters and advances slowly in two long lines between two ranks of soldiers up the nave. This majestic procession is closed by the pontiff himself, seated in a chair of state supported by twenty valets, half concealed in the drapery that falls in loose folds from the throne; he is crowned with his tiara, and bestows his benediction on the crowds that kneel on all sides as he is borne along. When arrived at the foot of the altar he descends, resigns his tiara, kneels, and assuming the common mitre seats himself in the episcopal chair on the right side of the altar, and joins in the psalms and prayers that precede the solemn service. Towards the conclusion of these preparatory devotions his immediate attendants form a circle around him, clothe him in his pontifical robes, and place the tiara on his head: after which, accompanied by two deacons and two sub-deacons, he advances to the foot of the altar, and, bowing reverently, makes the usual confession. He then proceeds in great pomp through the chancel, and ascends the pontifical throne, while the choir sing the *Introitus* or psalm of entrance, the *Kyrie Eleison* and *Gloria in excelsis*, when the pontiff lays aside his tiara, and after having saluted the congregation in the usual

[1] Tour in Italy, vol. i, p. 365.

form, *the Lord be with you*, reads the collect in an elevated tone of voice, with a degree of inflection just sufficient to distinguish it from an ordinary lecture. The epistle is then read, first in Latin then in Greek; and after it some select verses from the psalms, intermingled with alleluias, are sung to elevate the mind and prepare it for the gospel.

'The pontiff then rises, gives his benediction to the two deacons that kneel at his feet with the book of the gospels, and, resigning his tiara, stands while the gospel is sung in Latin and in Greek; after which he commences the Nicene creed, which is continued in music by the choir. When the creed and the psalm that follows it are over, he descends from his throne, and approaching the altar with the same attendants and the same pomp as in the commencement of the service, he receives and offers up the usual oblations, fumes the altar with frankincense from a golden censer, and then washes his hands; a ceremony implying purity of mind and body. He then turns to the people, and in an humble and affectionate address begs their prayers; and shortly after commences that sublime form of adoration and praise, called "the preface," because it is an introduction to the most solemn part of the liturgy, and he chaunts it in a tone supposed to be borrowed from the antient tragic declamation, and very noble and impressive. The last words, "Holy, Holy, Holy, Lord God of armies," &c. are uttered in a posture of profound adoration, and sung by the choir in notes of deep and solemn intonation. All music then ceases, all sounds are hushed, and an awful silence reigns around, while in a low tone the pontiff recites that most antient and venerable invocation which precedes, accompanies and follows the consecration, and concludes with great propriety in the Lord's Prayer, chaunted with a few emphatical inflections.

'Shortly after the conclusion of this prayer, the pontiff salutes the people in the antient form, "May

the peace of the Lord be always with you," and returns to his throne, while the choir sing thrice the devout address to the Saviour, taken from the gospel, "Lamb of God, who takest away the sins of the world, have mercy upon us." When he is seated, the two deacons bring the holy sacrament, which he first reveres humbly on his knees, and then receives in a sitting posture: the deacons and the sub-deacons then receive the communion under both kinds, the anthem after communion is sung, a collect follows, and the deacon dismisses the assembly.

'The pope then offers up his devotions on his knees at the foot of the altar, and, borne along in the same state as when he entered, passes down the nave of the church, and ascends by the *Scala Regia* to the grand gallery in the middle of the front of St. Peter's. His immediate attendants surround his person, the rest of the procession draws up on each side. The immense area and colonnade before the church are lined with troops and crowded with thousands of spectators. All eyes are fixed on the gallery; the chaunt of the choir is heard at a distance; the blaze of numberless torches plays round the columns; and the pontiff appears elevated on his chair of state under the middle arch. Instantly the whole multitude below fall on their knees; the cannons of *St. Angelo* give a general discharge, while, rising slowly from his throne, he lifts his hands to heaven, stretches forth his arm, and thrice gives his benediction to the crowd, to the city, and to all mankind: a solemn pause follows, another discharge is heard, the crowd rises, and the pomp gradually disappears.'

15, 16.—WHIT-MONDAY *and* WHIT-TUESDAY.

These days are observed as festivals, for the same reason as Monday and Tuesday in Easter. Their religious character, however, is almost obsolete, and they are now kept as holidays, in which the lower classes still pursue their favourite diversions.

In 'auntient tymes' Whitson Plays were acted at

this season. At Chester, these plays were twenty-five in number, and were performed for above three centuries, annually. In the year 1600, they were *enacted* by the craftsmen of the twenty-five companies, who were all dressed in suitable habits. The subjects were taken from the Scriptures.

Every third year, on Whit-Tuesday, the *Montem* at Eton is celebrated. It consists of a procession to a small tumulus on the southern side of the Bath road, which has given the name of Salt-Hill to the spot, now better known by the splendid inns that are established there. The chief object of this celebration, however, is to collect money for salt (according to the language of the day) from all persons who assemble to see the show, nor does it fail to be exacted from travellers on the road, and even at the private residences within a certain, but no inconsiderable, range of the spot. The scholars who collect the money are called salt-bearers, who are arrayed in fancy dresses, and are attended by others called scouts, of a similar but less showy appearance. Tickets are given to such persons as have paid their contributions to secure them from any further demand. This ceremony is always very numerously attended by Etonians, and has frequently been honoured by the presence of his Majesty and the different branches of the royal family. The sum collected on the occasion has sometimes exceeded 800*l.*, and is given to the senior scholar, who is called captain of the school. This procession appears to be coeval with the foundation; and it is the opinion of Mr. Lysons, whose industry in collecting, as well as judgment in deciding on matters of this character, are beyond all challenge, that it was a ceremonial of the Bairn or Boy Bishop[1].

Mr. Hakewill, however, in his 'History of Windsor,' observes, and with some propriety, 'why may not

[1] See December 6th, St. Nicholas.

this custom be supposed to have originated in a procession to perform an annual mass at the altar of some saint, to whom a small chapel might have been dedicated on the mount called Salt Hill? a ceremony very common in Catholic countries; as such an altar is a frequent appendage to their towns and populous villages. As for the selling of salt, it may be considered as a natural accompaniment, when its emblematical character, as to its use in the ceremonies of the Roman Catholic church, is contemplated.

Till the time of Dr. Barnard, the montem was every two years, and on the first or second Tuesday in February. It consisted of something of a military array. The boys in the Remove, fourth and inferior forms, marched in a long file of two and two, with white poles in their hands, while the sixth and fifth form boys walked on their flanks as officers, and habited in all the variety of dress which Monmouth-street could furnish, each of them having a boy of the inferior forms smartly dressed attending upon him as a footman. The second boy in the school led the procession in a military dress, with a truncheon in his hand, and bore for the day the title of Marshal; then followed the Captain, supported by his chaplain, the head scholar of the fifth form, dressed in a suit of black, with a large bushy wig, and a broad beaver decorated with a twisted silk hatband and rose, the fashionable distinction of the dignified clergy of that day. It was his office to read certain Latin prayers on the mount at Salt Hill. The third boy of the school brought up the rear as Lieutenant. One of the higher classes, whose qualification was his activity, was chosen ensign, and carried the colours, which were emblazoned with the college arms, and the motto "Pro More et Monte." This flag, before the procession left the college, he flourished in the school-yard, with great dexterity, as displayed sometimes at Astley's and places of similar exhibition. The same ceremony was repeated after prayers on the

mount. The whole regiment dined in the inns at Salt-Hill, and then returned to the college, and its dismission in the school yard was announced by the universal drawing of all the swords. Those who bore the title of commissioned officers were exclusively on the foundation, and carried spontoons; the rest were considered as serjeants and corporals, and a most curious assemblage of figures it exhibited. The two principal salt-bearers consisted of an oppidan and a colleger: the former was generally some nobleman, whose figure and personal connections might advance the interests of the collection. They were dressed like running footmen, and carried, each of them, a silk bag to receive the contributions, in which was a small quantity of salt. During Doctor Barnard's mastership, the ceremony was made triennial, the time changed from February to Whit-Tuesday, and several of its absurdities retrenched.'—*See Hakewill's History of Windsor.*

The Whitsun Ales and other customs formerly observed at this season, are noticed in T. T. for 1814, pp. 119-20.

Poor Robin, in his Almanack for May 1757, has some homely lines illustrative of the amusements at this season.

The term goes out, and must give way
To th' pleasant time of Whitsunday;
When men and maids, to take the air,
To Highgate or Hyde-Park repair.
Some who are wise, or otherwise,
Go down to Hampstead or Belsize[1];
Some handsome girl picks up a spark,
And walks into St. James's Park:
Some in Moorfields, some on Tower-hill;
And let the rest go where they will.

[1] Belsize House at Hampstead was, formerly, a place of considerable notoriety for public diversions. It was open for the entertainment of gentlemen and ladies during the whole summer season, with dancing. An advertisement in one of the papers of the day says, 'the park, wilderness and garden are wonderfully improved, and filled with variety of birds which compose a most melodious and delightful harmony. Persons inclined to walk

Again, in the Almanack for May 1758: 'now the female sex are very busy mustering and exercising their best attire; nothing's more pleasing to a woman (especially if she be handsome) than gay rigging and a large looking-glass; which last is to her both council of state, council of war, and exchequer. About the middle of this month expect great resort to Islington, Newington, and the parts adjacent, by Froth the tapster, Bill the taylor, Lavender the broker, Whiff the tobacco-seller, Gill Turn-tripe, Mrs. Fumkins, Madam Polerat, and my lady Trash; to the great confusion or consumption of cheese-cakes, plumb-cakes, bottled ale, and stew'd prunes.

'Some maids will be so unfortunate, that though it should rain husbands, not one of them will fall to their share this month.'

In the Almanack for May 1760, are the following lines:

The ladies now, to take the air,
To Stepney or Hyde-Park repair,
While many others do resort
For cakes and ale to Tot'nam-Court;
And on the Whitsun-Holiday
At barly break and stool-ball play,
And thus the holidays they spend
Until they work them to an end.

19.—SAINT DUNSTAN.

Dunstan was a native of Glastonbury, and nobly descended; Elphegus Bishop of Winchester, and Athelm Archbishop of Canterbury, being his uncles; he was also related to King Athelstan. He was a skilful painter, musician, and an excellent forger and refiner of metals: he manufactured crosses, vials, and sacred vestments; he also painted and copied good books.

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and divert themselves may breakfast on tea or coffee as cheap as at their own chambers. *Twelve stout fellows, completely armed, to patrole between Belsize and London!* The diversion of hunting the deer was also pursued in the park. Four hundred coaches belonging to the nobility and gentry have been counted at this place at one time.—See *Park's Topography and Natural Hist. of Hampstead*, pp. 246-249.

Duncan was promoted to the see of Worcester by King Edgar; he was afterwards Bishop of London, and Archbishop of Canterbury. He died in 988, in the 64th year of his age, and in the 27th of his archiepiscopal dignity. His miracles are too commonly known to be repeated.

19.—QUEEN CHARLOTTE BORN.

Her present Majesty (Princess Charlotte of Mecklenburgh Strelitz) was born on the 19th of May, 1744; but her birth-day is celebrated on the 18th of January.

21.—TRINITY SUNDAY.

Stephen, Bishop of Liege, first drew up an office in commemoration of the Holy Trinity, about the year 920; but the festival was not formally admitted into the Romish church till the fourteenth century, under the *pontificate* of John XXII.

25.—CORPUS CHRISTI.

This festival, 'the body of Christ,' was appointed in honour of the Eucharist, and always falls on the Thursday after Trinity Sunday. This day, termed the *Fête Dieu*, is one of the greatest festivals of the Romish church, beginning on Trinity Sunday, and ending on the Sunday following. The common mode of celebrating this festival is by grand masses and processions of the holy sacrament only; but at Aix, a procession on the occasion was instituted by King René, which (says Miss Plumptre) ranks beyond dispute, as one of the most extraordinary among the many extraordinary ceremonies, which, at various times, and in various countries, have been introduced under the idea of religious ceremonies. The singularly curious narrative of the Fête Dieu occupies more than twenty pages of Miss Plumptre's work, and as it cannot be abridged with justice to the authoress, we must refer our readers to the second volume of her '*Residence in France*,' pp. 220-241.

We have only room to subjoin some account of

poor puss's exhibitions on this day, in times past, from another source.

The part acted by the CAT, in the town of Aix (in Provence), on the festival of *Corpus Christi*, may well vie, in profaneness, with that of the Ass of Sens, on Christmas Day[1]. The finest tom cat of the country, wrapt in swaddling clothes, like a child, was, on this occasion, exhibited to the adoration of the gaping multitude, in a magnificent shrine. Flowers were strewed before him; every knee bent as he passed, and the adorations he received unequivocally pointed him out as the god of the day. *This ceremony was not suppressed till about the year 1757 !!!*

On St. John's day, the scene was greatly altered for poor puss. A number of cats were collected, and put in a wicker basket. The bishop, at the head of his clergy, lighted a bonfire, in the middle of a square before the cathedral church; and when the flames were raging most furiously, the poor animals were thrown alive into the fire. The clergy went afterwards several times round the burning pile, singing hymns and anthems appropriated to the sacrifice[2].

[1] *See* CHRISTMAS DAY for an account of this singular ceremony.

[2] The clergy of Bruxelles, in their famous procession of *Sablon*, greatly outdid their brethren of Aix. A BEAR was exhibited, *clad in a surplice*, and decked with ribbons, majestically sitting in a chariot and *playing on an organ*. The music was not produced by the air, compressed in pipes, as in common instruments. TWELVE CATS were separately confined, in narrow cells, so contrived in the organ-chest, that they could not turn any way; their tails were drawn through twelve small holes, made at the top, and were fixed by ropes to the keys of the instrument. By this piece of machinery, whenever the bear laid his heavy paws upon the keys, the cats, strongly pulled by the tails, *mewed most horribly*, and this *melody* was powerfully reinforced by the voices of the choristers, who performed, with all their might, a well-suited accompaniment.

26.—AUGUSTIN, or *Austin.*

This *English apostle,* as he is termed, was commissioned by Pope Gregory the Great to convert the Saxons. He was created archbishop of Canterbury in 556, and died about the year 610. St. Augustin landed in the Isle of Thanet, on the east side of Kent, in the year 596; and had, including interpreters, more than forty persons with him. From this place St. Augustin sent to Ethelbert, King of Kent, signifying that he was come from Rome, and brought him a most happy message, with an assured divine promise of a kingdom which would never have an end. The king ordered them to remain in that island, where he took care they should be furnished with all necessaries, while he deliberated what to do. This great prince held in subjection all the other English kings who ruled on this side the Humber: nor was he a stranger to the christian religion; for his queen Bertha, a daughter of Charibert, King of Paris, was a Christian, and had with her Luidhard, Bishop of Senlis, for her director and almoner. After some days the king went in person to the isle, but sat in the open air to admit Augustin to his presence; for he had a superstitious notion, that if he came with any magical spell, this would have an effect upon him in a house, but not in the open fields. The religious men came to him in procession, 'carrying for their banner a silver cross and an image of our Saviour painted on a board; and, singing the litany as they walked, made humble prayer for themselves and for the souls of those to whom they came.' Being admitted into the presence of the king, they announced to him the word of life. His majesty listened attentively; but answered that their words and promises indeed were fair, but new, and to him uncertain: however, that since they were come a great way for his sake, they should not be molested nor hindered from preaching to his subjects. He also appointed them necessary subsistence and a dwelling-place in Canterbury, the

capital of his dominions. They came thither in procession singing, and imitated the lives of the apostles; serving God in prayer, watching and fasting, and ready to suffer or die for the faith which they preached. There stood near the city an old church of St. Martin, left by the Britons. In this was the queen accustomed to perform her devotions; and in it the apostolic preachers began to assemble to sing, say mass, preach and baptize, till upon the king's conversion they had license to repair and build churches every where.—(*Butler.*)

27.—VENERABLE BEDE.

Bede was born at Yarrow in Northumberland, in 673, and afterwards instructed in the Greek and Latin languages, in which he made a surprising proficiency. He is author of several very learned philosophical and mathematical tracts; as, also, of long and laborious comments on the Scriptures. His grand work, however, is the Ecclesiastical History of the Saxons. Bede has obtained the title of *venerable*, for his profound learning and unaffected piety, and not on account of any celebrity for miraculous and angelic operations.

The celebrated Mabillon mentioning Bede as a most illustrious instance of learning, in the monastic institute, says: 'Who ever applied himself to the study of every branch of literature, and also to the teaching of others, more than Bede? Yet who was more closely united to heaven by the exercises of piety and religion? To see him pray, says an antient writer, one would have thought he left himself no time to study; and when we look at his books, we wonder how he could have found time to do any thing else but write.' Camden calls him 'the singular and shining light;' and Leland, 'the chiefest and brightest ornament of the English nation; most worthy, if any man ever was, of immortal fame.' William of Malmesbury says, it is easier to admire him in thought, than to do him justice in expression.

29.—KING CHARLES II RESTORED.

On the 8th of May, 1660, Charles II was *proclaimed* in London and Westminster, and afterwards throughout his dominions with great joy and universal acclamations. On the 16th he came to the Hague; the 23d he embarked with his two brothers for England, and landed at Dover on the 25th, where he was received by General Monk, and some of the army. He was then attended by numbers of the nobility and gentry to Canterbury, and on the 29th he made his magnificent entry into London. This day is also his birth-day.

In some parts of England it is customary for the common people to wear oak leaves, covered with leaf-gold, in their hats, in commemoration of the concealment of Charles II, in an oak tree, after the battle of Worcester. To this tree, not far from Boscobel House, the king and his companion Colonel Careless resorted, when they thought it no longer safe to remain in the house; climbing up by the hen-roost ladder, and the family giving them victuals on a nut-hook.

King Charles's *own narrative* of his escape to France, is, perhaps, sufficiently curious to be introduced in this place. It is copied from a rare tract.

'We went towards Shoreham, four miles off a place called Brighthelmstone, taking the master of the ship with us, on horseback, behind one of our company, and came to the vessel's side, which was not above sixty tun. But it being low water, and the vessel lying dry, I and my Lord Wilmot got up with a ladder into her, and went and lay down in the little cabbin, till the tide came to fetch us off.

'But I was no sooner got into the ship, and lain down upon the bed, but the master came in to me, fell down upon his knees, and kist my hand; telling me, that he knew me very well, and would venture life, and all that he had in the world, to set me down safe in France.

'So about seven o'clock in the morning, it being high-water, we went out of the port; but the master being bound for Pool, loaden with sea-coal, because he would not have it seen from Shoreham that he did not go his intended voyage, but stood all the day, with a very easy sail, towards the Isle of Wight (only my Lord Wilmot and myself, of my company, on board). And as we were sailing, the master came to me, and desired me that I would persuade his men to use their endeavours with me to get him to set us on shore in France, the better to cover him from any suspicion thereof. Upon which, I went to the men, which were four and a boy, and told them, truly, that we were two merchants that had some misfortunes, and were a little in debt; that we had some money owing us at Rouen, in France, and were afraid of being arrested in England; that if they would persuade the master (the wind being very fair) to give us a trip over to Dieppe, or one of those ports near Rouen, they would oblige us very much, and with that I gave them twenty shillings to drink. Upon which, they undertook to second me, if I would propose it to the master. So I went to the master, and told him our condition, and that if he would give us a trip over to France, we would give him some consideration for it. Upon which he counterfeited difficulty, saying, that it would hinder his voyage. But his men, as they had promised me, joining their persuasions to ours, and, at last, he yielded to set us over.

'So about five o'clock in the afternoon, as we were in sight of the Isle of Wight, we stood directly over to the coast of France, the wind being then full north; and the next morning, a little before day, we saw the coast. But the tide failing us, and the wind coming about to the south-west, we were forced to come to an anchor within two miles of the shore, till the tide of flood was done.

'We found ourselves just before an harbour in

France, called Fescamp; and just as the tide of ebb was made, espied a vessel to leeward of us, which, by her nimble working, I suspected to be an Ostend privateer. Upon which, I went to my Lord Wilmot, and telling him my opinion of that ship, proposed to him our going ashore in the little cock-boat, for fear they should prove so, as not knowing, but finding us going into a port of France (there being then a war betwixt France and Spain), they might plunder us, and possibly carry us away and set us ashore in England; the master also himself had the same opinion of her being an Ostender, and came to me to tell me so, which thought I made it my business to dissuade him from, for fear it should tempt him to set sail again with us for the coast of England: yet so sensible I was of it, that I and my Lord Wilmot went both on shore in the cock-boat; and going up into the town of Fescamp, staid there all day to provide horses for Rouen. But the vessel which had so affrighted us, proved afterwards only a French boy.

'The next day we got to Rouen, to an inn, one of the best in the town, in the fish-market, where they made difficulty to receive us, taking us, by our cloaths, to be some thieves, or persons that had been doing some very ill thing, until Mr. Sandburne, a merchant, for whom I sent, came and answered for us.

'One particular more there is observable in relation to this our passage into France; that the vessel that brought us over had no sooner landed me, and I given her master a pass, for fear of meeting with any of our Jersey frigates, but the wind turned so happily for her, as to carry her directly for Pool, without its being known that she had ever been upon the coast of France.

'We staid at Rouen one day, to provide ourselves better cloaths, and give notice to the queen, my mother who was then at Paris), of my being safely landed. After which, setting out in a hired coach,

I was met by my mother, with coaches, short of Paris; and by her conducted thither, where I safely arrived.'

Astronomical Occurrences.

Eclipses.

ALTHOUGH we have given a popular account of eclipses in p. 181-5 of the last volume of the 'Time's Telescope,' we shall renew the subject, in order to illustrate it with figures, and shall begin with the eclipses of the Moon.

Every planet and satellite is illuminated by the Sun, and casts a shadow towards the point of the heavens which is opposite to that body. This shadow is occasioned by the privation of light in the space hidden from the Sun by the opaque body that intercepts his rays. Hence the Moon can only become eclipsed by the interposition of an opaque body, which intercepts from it the light of the Sun; and it is certain that this opaque body is the Earth, because the eclipses of the Moon never happen except when the Moon is in opposition, and consequently when the Earth is interposed between her and the Sun. The Earth being spherical, projects behind it, relatively to the apparent motion of the Sun, a conical shadow, whose axis is a straight line that joins the centres of the Earth and Sun, and which terminate at the point when the apparent diameters of these two bodies become equal.

If the Earth and Sun were of equal magnitudes, the Earth's shadow would be infinitely extended, and every where equal in diameter: in this case the planet Mars would, when it was in either of its nodes, and opposite to the Sun, be eclipsed in the Earth's shadow. But if the Earth were larger than the Sun, its shadow would increase in bulk the farther it extended, and would eclipse the other superior planets

and their satellites, when they were in opposition to the Sun. But as Mars, in opposition, never falls into the Earth's shadow, although he is not, in that situation, more than fifty millions of miles from us, it is evident that the Earth is much less than the Sun, otherwise its shadow could not end in a point at so small a distance.

If the Sun and Moon were of equal diameters, the Moon's shadow would go on to the Earth with an equal breadth, and cover a portion of the Earth's surface more than 2000 miles broad, even if it fell directly against the Earth's centre, as seen from the Moon, and much more if it fell obliquely on the Earth; but it is well ascertained that the Moon's shadow is seldom 150 miles broad at the Earth, unless when it falls very obliquely on the Earth, in total eclipses of the Sun. In annular eclipses, the Moon's real shadow ends in a point at some distance from the Earth. The Moon's small distance from the Earth, and the shortness of her shadow, prove her to be less than the Sun; and as the Earth's shadow is large enough to cover the Moon, if her diameter were thrice as large as it is, which is evident from her long continuance in the shadow when she goes through its centre, it is plain that the Earth is larger than the Moon.

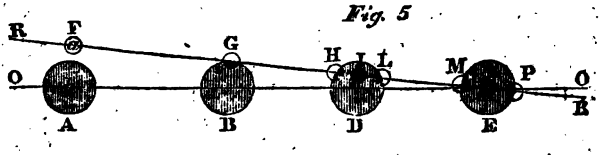
Though all opaque bodies, on which the Sun shines, have their shadows, yet such is the magnitude of the Sun, and the distances of the planets, that the primary planets can never eclipse one another. A primary planet can eclipse only its secondary, or be eclipsed by it, and never but when in opposition or conjunction with the Sun. The primary planets are seldom in this position, but the Sun and Moon are so every month, which would produce eclipses as often, but for other circumstances which we shall now explain.

We must conceive of the orbits of the Moon and Earth as not coinciding with one another, but as

inclined in a given angle of five degrees. The thing may be thus illustrated; suppose two hoops fastened together with rivets on the opposite sides, and the half of one of them to be raised above the other, then the opposite half will fall below it, and the two hoops may be said to be inclined to each other by an angle, which will be greater or less in proportion as the one is raised above the other more or less: now the opposite points in which the hoops are joined by rivets will give the idea of the nodes of the orbits of the planets, and it is only when the Earth and Moon are in or near these nodes, that eclipses can occur.

1. The Moon at the full will not be eclipsed, if its latitude is equal to, or greater than, the sum of its own semidiameter, added to the semidiameter of the Earth's shadow. Because a circle or ellipse appears as a right line when the eye is in the same plane with it; let OO, fig. 5, represent the plane of

Fig. 5



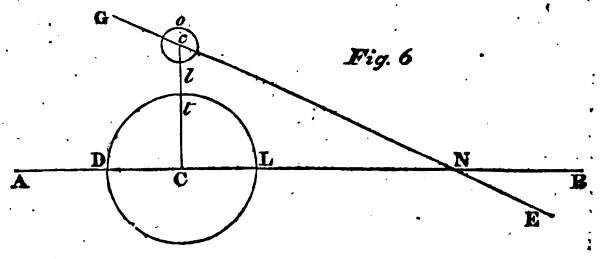


Fig. 6

the ecliptic, or Earth's orbit, RR the plane of the Moon's orbit, and N the node. At full Moon, if the Earth's shadow be at A, the Moon F must be in

the same part of the heavens, because at that time it is in opposition. But because only one half of the shadow of the Earth is on the same side of the ecliptic with the Moon, only one half of the Moon's breadth is on the side of its orbit towards the Earth's shadow; and as these do not pass through each, or even touch, or in other words because the distance from *a* to *b*, which may be called the Moon's latitude, is greater than the sum of the Moon's semidiameter added to the semidiameter of the Earth's shadow, there will be no eclipse. More generally, if GE (fig. 6) be an arc of the Moon's orbit, AB an arc of the ecliptic, and C*c* an arc in a secondary of the ecliptic equal to the Moon's latitude, and if this arc be equal to or greater than C*t* + *cl*, it is manifest that the shadow cannot pass over any part of the Moon's disk.

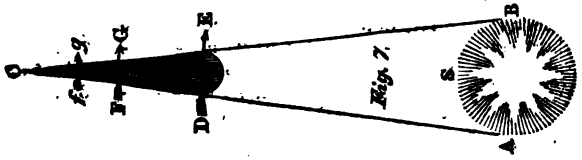
2. The Moon, at the full, will be partially eclipsed, if its latitude be less than the sum, but greater than the difference of its own semidiameter, and that of the Earth's shadow. For suppose C*c* (see figs. 5 and 6), the latitude of the Moon, to be less than C*t*, *cl*, the sum of the semidiameters of the shadow, and Moon, *l*, the lower edge of the Moon will be below *t*, the upper edge of the shadow; accordingly the side of the Moon towards the ecliptic will be eclipsed. But, because C*c*, the Moon's latitude, added to *co*, its semidiameter, is greater than C*t*, the semidiameter of the Earth's shadow, the upper edge of the Moon *o* cannot come within the shadow, whence the eclipse will be partial. And because, in this case, the Moon's latitude, together with its semidiameter, is greater than the semidiameter of the shadow, the Moon's latitude is greater than the difference of the semidiameters of the shadow and the Moon; or because C*c* + *co* is greater than C*t*, C*c* is greater than C*t* — *co*.

3. The Moon will, at the full, be totally eclipsed, if its latitude is less than the difference between its own semidiameter and that of the Earth's shadow.

Because if $Co + co$ be less than Ct, that is, if Cc be less than $Ct - ct$, the upper edge of the Moon may come within the shadow of the Earth.

Hence it is evident if, in the moment of the Moon's opposition, she is found in the place F (fig. 5) in her orbit, she will be too far from her node, which is N, and will have too great latitude to be able to reach the shadow. But if she is found in G, a portion of her disk will be plunged into the shadow, and there will be a partial eclipse; and if the Moon is still nearer her node, as at H, there will be a greater obscuration, and even a total eclipse, for some length of time.

But if in the moment of opposition the Moon is found precisely in her node N, the eclipse will be total and central, and will continue a much longer time than it did when it was at H; for now the centre of the Moon coincides with the axis of the conical shadow formed by the Earth, and this conical shadow DEC (fig. 7), occupying in the orbit of the



Moon FG, or fg, a space greater than the diameter of the Moon, it casts a shadow over this body, for a time proportioned to the length by which the diameter of the shadow exceeds that of the Moon, and it is this that causes the continuance of this body in the shadow. The Moon remains thus obscured, the longest time when the Sun is farthest from the Earth, and the Moon is nearest the Earth, as in FG, for there the conical shadow is the greatest that it can be; and the Moon being in the point L of her orbit, is found traversing the shadow in the place where it has the greatest diameter FG: whereas when the Moon M is in apogee, that is the farthest

from the Earth, she traverses the conical shadow nearer the summit C, where the shadow *fg* is narrow.

When the Moon is totally eclipsed, she does not cease to be visible, for it is only the shadow of the Earth which is cast upon her. In this case she appears of a copper colour, a circumstance which arises from the scattered rays of the light from the Moon, which are refracted by the terrestrial atmosphere, and, crossing each other, afford a faint picture of the body of the Moon. This light is feeble, because it is but small in quantity; and it is of a reddish colour, because only the red rays can penetrate our atmosphere. This is more obscure in proportion as the Moon is nearer the Earth at the time of the eclipse: there have been eclipses when the Moon has totally disappeared; this, however, rarely happens.

Table of the Sun's Rising and Setting every 10th Day:

Monday	1st, Sun rises 4 h. 37 m.	Sun sets 7 h. 23 m.
Thursday	11th, - - - - - 4 h. 21 m.	- - - - - 7 h. 39 m.
Sunday	21st, - - - - - 4 h. 6 m.	- - - - - 7 h. 54 m.
Wednesday	31st, - - - - - 3 h. 54 m.	- - - - - 8 h. 6 m.

Table of Equation of Time for every fifth Day.—[See January.]

		m.	*s.*
Monday	1, *from* the time marked on the dial *subtract*	3	0
Saturday	6, - - - - - - - - - - - - - - - -	3	35
Thursday	11, - - - - - - - - - - - - - - - -	3	52
Tuesday	16, - - - - - - - - - - - - - - - -	3	57
Sunday	21, - - - - - - - - - - - - - - - -	3	48
Friday	26, - - - - - - - - - - - - - - - -	3	26
Wednesday	31, - - - - - - - - - - - - - - - -	2	51

The Sun enters Gemini on the 21st, at 23 m. past 12 at night. On the 23d, at five o'clock in the morning, the Moon passes over β in the constellation Virgo.

The Moon enters her last quarter at 43 m. before

one in the morning. It is new Moon, or change, on the 9th, at 20 m. past six: she enters her first quarter on the 16th, at 47 m. past two: is full at 57 m. past four in the morning of the 23d, and enters her last quarter 4 m. past six in the morning of the 31st.

The Moon passes the meridian on the

20th day, at	16 m. past	10	in the evening.
21st	4	11	
22d	54	11	
23d	44	12	

Table of the Eclipses of Jupiter's first Satellite:—The calculations for this month refer to the Emersions.

4th day, at	3 m. after	1	in the morning
12th	26	9	evening
19th	20	11	

Mercury's superior conjunction happens on the 21st, at 11 in the evening. Saturn is in his quadrature on the 2d, at nine in the evening; and the Herschel is in opposition at four in the morning of the 26th.

HISTORY OF ASTRONOMY.

[Continued from p. 136.]

Alphonsus, King of Castile, who flourished about the middle of the thirteenth century, was the first prince who contributed to the progress of astronomy in Europe. He founded a college at Toledo, for the advancement of the science, and assembled, without regard to the expense, all the learned Arabians in Spain. By their combined efforts the Alphonsine tables were made, in the year 1252, which, though founded upon the same principles as those of Ptolemy, were much more correct, in consequence of the superior accuracy to which the science had attained.

An impulse was now given to the human mind,

and knowledge began rapidly to be propagated through every part of Europe. In our country, Roger Bacon pointed out the necessity of correcting the calendar. Nicolas Cusa, a cardinal of the Romish church, discovered some errors in the Alphonsine tables, and maintained the motion of the Earth round the Sun. Purback undertook a translation of the Almagest of Ptolemy: he composed a treatise on the theory of the planets; he determined the obliquity of the ecliptic; he constructed several instruments for dialling, and celestial globes. Purback died in 1461. Regiomontanus, the pupil of Purback, went to Rome to prepare himself for the study of the Almagest by the acquisition of the Greek language. His treatise on trigonometry added greatly to his reputation, and the senate of Nuremberg invited him to that city. Having accepted the invitation, Regiomontanus erected an observatory, with the aid of Bernard Walther, and furnished it with excellent instruments, which he had either invented or improved. In February 1472, Regiomontanus made observations on a comet, the tail of which was more than 30 degrees long, and, in its motion to the perigee, it described an arc of 30 degrees in 24 hours. He was invited by Pope Sextus IV, to assist in the reformation of the calendar, and being allured by the promise of the bishopric of Ratisbon, he repaired to Rome in 1475, but was cut off by the plague in a few months. The place of Regiomontanus was supplied by Walther, his friend and disciple, who continued to observe the heavens about 30 years after the death of his master. This astronomer was the first who made use of clocks in his observations of the heavens. His account of eclipses and occultations, and of the longitudes and distances of the planets, &c. were published with those of Regiomontanus in 1554, by order of the senate of Nuremberg.

Walther was succeeded by John Werner, who was the first that explained the method which is now

employed for finding the longitude at sea by the distance of a fixed star from the Moon. He constructed a planetarium, and he made out the precession of the equinoxes to be at the rate 1° 10′ in 100 years.

Copernicus, a native of Thorn in Prussia, was appointed professor of mathematics at Rome, and began to make observations about the year 1500. He adopted the system of Pythagoras, respecting the motion of the Earth and the immobility of the Sun. From this hypothesis all the celestial phenomena received a plausible explanation. The apparent diurnal motion of the heavens, he said, was a deception arising from the terrestrial globe; and the precession of the equinoxes was explained by a slight variation in the position of its axis. The retrograde motions and the stationary appearances of the planets which have been described in this volume, and which previously to Copernicus had so long perplexed astronomers, were by him most satisfactorily explained. This system, remarkable for its simplicity, and its conformity with all the laws of mechanics and physics, the author defended and explained in the first book of his work, entitled 'Astronomia Instaurata, sive de Revolutionibus Orbium Celestium.' This work was completed about the year 1530, but, fearful of the consequences of vulgar prejudice, he kept it concealed several years. He died in 1543, on the very day on which he received a complete copy of his work from the hands of the printer.

Copernicus was succeeded by a number of astronomers who enriched the science with numerous observations, but without extending the boundaries of discovery. Gemma Frisius invented a new method of projection, and Nonius suggested the contrivance that goes by his name, for subdividing the divisions of instruments. We now come to Tycho Brahe, who became acquainted with the most distinguished astronomers of the age, and was presented by Frederic King of Denmark with the island of

Huen, in the Sound, where he built the celebrated observatory which he called Unaniberg, and in which he made many discoveries. At the death of the king all pensions were stopped, and Tycho was commanded to discontinue his observations. The venerable astronomer, accompanied by his wife and children, and carrying with him his books and instruments, was forced to seek, in a foreign land, for a more permanent asylum. After this he retired to Rostock, and found a steady patron in the Emperor Rodolph II, who settled upon him a handsome pension, and erected an observatory for his use in the neighbourhood of Prague. Here he had for disciples and companions, Longomontanus and the illustrious Kepler; but no society seemed to balance the loss of his native country, the remembrance of which preyed upon his mind, and probably hastened his death, which happened in October 1601. Tycho, by means of the large and accurate instruments which he invented, formed a catalogue of 777 stars, which was much more correct than that of Hipparchus and Ulugh-Beigh. He was prompted to this undertaking by the sudden appearance of a new star in Cassiopeia in 1572, which shone with a greater brilliancy than Venus, and was frequently visible in the middle of the day. Its twinkling would occasionally exhibit the prismatic colours, and having retained its lustre for several weeks, its splendour gradually diminished, till it disappeared in March 1574. Tycho is more celebrated for the improvements which he made upon the lunar theory. Of the system of the world which he invented, we have given an account in the introduction to this volume.

At the death of Tycho, Kepler was put in possession of his valuable observations on the planets, which were the means of conducting him to some important discoveries in astronomy. He first ascertained that the planet Mars revolved in an elliptical orbit, and that the Sun was placed in one of its foci. He then

determined the dimensions of his orbit, and by comparing together the times employed by the planet in completing a whole revolution, or any part of it, he discovered that the times in which Mars described any arc of the ecliptic were always in proportion to the areas contained by lines drawn from the focus to the extremities of the respective arcs, or, in other words, that the radius-vector described equal areas in equal times. The same law he found to hold in the orbits of all the other planets, and likewise in those of the satellites with regard to their primary. In the year 1626 he published his Rodolphine Tables, computed on the true laws of the planetary motions, and after many years study he discovered that the squares of the periodic times of the planets were as the cubes of the mean distances from the Sun, a law which he found to prevail in the orbits both of the primary and secondary planets. This grand law he fully explained in his *Astronomia Nova celestis, tradita cum Commentariis de motibus stellæ Martis,* which laid the foundation of physical astronomy, and paved the way for the sublime and noble discoveries of Newton. Kepler died in the year 1631, and, at this period, discoveries of great importance were making in Italy by Galileo.

The discovery of the telescope enabled the human mind to penetrate into the remotest regions of space, and far beyond the limits which unassisted nature seemed to have assigned. Though Galileo had not the merit of inventing this admirable instrument, he greatly improved it, and applied it to the heavens. His first observations, which were on the Moon, led him to conclude, that this luminary was an opaque body like the Earth, and that its surface was varied with hills and vallies. He perceived in every part of the heavens numbers of stars, which were beyond the reach of unassisted vision, and he inferred that the light of the milky way arose from the innumerable stars which were collected in that zone of the hea-

vens. He had the honour and happiness of discovering four satellites, circulating round the planet Jupiter; and he verified the prediction of Copernicus, that Venus would exhibit phases similar to those of the Moon. The distance of Saturn was too great for the imperfect instrument which Galileo employed, but he ascertained that it was not round like the rest; he thought it was composed of three distinct bodies. The appearance of the fixed stars like brilliant points, when magnified by the telescope, and other discoveries which he made, settled almost to demonstration the Copernican hypothesis, and Galileo disseminated and boldly defended the doctrine of the Earth's motion. The *holy*, or, more properly, the infernal inquisition, denounced the philosopher as the abettor of irreligious opinions. He was tried, and condemned of heresy, and in a moment of weakness agreed to sign a formula, in which he abjured, execrated, and detested, the error of the Earth's motion. 'What a mortifying picture,' says his biographer, 'of human infirmity on the one hand, and of atrocious presumption on the other! A venerable old man turned of seventy, with his head silvered over by the study of nature, disavowing, against his conscience and judgment, the great truths which he had published to the world, and which shone forth in every part of those heavens to which he appealed! An assembly of reverend cardinals, encircling the aged philosopher on his knees, fixing the laws and arrangements of nature, repressing the great truths which she unfolds, and condemning to perpetual imprisonment the venerable sage, who first disclosed to man the unexplored regions of boundless space!'

The Naturalist's Diary.

'Tis MAY, the grace—confest she stands,
A branch of hawthorn in her hands;
The pale pink binds her auburn hair,
Her tresses flow with pastoral air:
Lo! near her trip the lightsome *dews*,
Their wings all tinged in Iris-hues;
With whom the powers of Flora play,
And paint with pansies all the way.

THIS month is remarkable for the profusion of verdure which it exhibits: nature's carpet is fresh laid, and nothing can be more grateful than to press its velvet surface. The scenery of a May morning is not unfrequently as beautiful as can possibly be conceived; a serene sky, a pure air, a refreshing fragrance arising from the face of the earth, and the melody of the feathered tribes, all combine to render it inexpressibly delightful, to exhilarate the spirits, and to call forth a song of grateful adoration. Well may we say to our companions, with the poet,—

Awake! the morning shines, and the fresh field
Calls us; we lose the prime to mark how spring
Our tender plants—
How nature paints her colours; how the bee
Sits on the bloom, extracting liquid sweet.

Another poet beautifully observes:—

Rise before the sun,
Then make a breakfast of the morning dew
Served up by Nature on some grassy hill;
You'll find it nectar.

Those who are constrained to live in large cities, and occasionally resort to the country, ought not to need such an invitation:—

The meanest floweret of the vale,
The simplest note that swells the gale,
The common sun, the air, the skies,
To *such* are opening Paradise.

The latest species of the summer birds of passage

arrive about the beginning of this month. (1) The *goatsucker*, or fern-owl (*caprimulgus Europæus*), which makes its appearance only in the dusk of the evening, to search for prey, and, while perched on a tree, utters a dull jarring noise. It leaves England about the end of August. (2) The spotted *fly-catcher* (*muscicapa grisola*) is the most mute and familiar of all our summer birds; it builds in a vine or sweet-briar, against the wall of a house, or on the end of a beam, and sometimes close to the post of a door: it returns to the same place year after year. The *sedge-bird* (*motacilla salicaria*) is found in places where reeds and sedges grow, and builds its nest there. It sings incessantly, night and day, during the breeding time, and imitates, by turns, the notes of the sparrow, the skylark, and other birds, from which it is called the English *mock-bird*.

The arduous time of incubation is now come, and birds are sedulously employed in hatching and rearing their young. Some further observations on the *nidification* of birds will, we presume, be acceptable to our readers. The nests constructed by birds of the rapacious tribes are in general rude, and composed of coarse materials, as dried twigs, bents, &c. But they are often lined with soft substances. They build in elevated rocks, ruinous and sequestered castles and towers, and in other solitary retirements. The aëry or nest of the eagle is quite flat, and not hollow, like those of other birds. The male and female commonly place their nest between two rocks, in a dry and inaccessible situation. The same nest, it is said, serves the eagle during life. The structure is so considerable, and composed of such solid materials, that it may last many years. Its form resembles that of a floor. Its basis consists of sticks about five or six feet in length, which are supported at each end, and these are covered with several layers of rushes and heath. An eagle's nest was found in the Peak of Derbyshire, which Willoughby describes in the fol-

lowing manner: 'It was made of great sticks, resting one end on the edge of a rock, the other on a birch tree. Upon these was a layer of rushes, and over them a layer of heath, and on the heath rushes again; upon which lay one young, and an addle egg; and by them a lamb, a hare, and three heath pouts. The nest was about two yards square, and had no hollow in it.' But the butcher-birds, or shrikes, which are less rapacious than eagles and hawks, build their habitations in shrubs and bushes, and employ moss, wool, and other soft materials.

The insect tribes continue to add to their numbers: among these may be named several kinds of moths and butterflies (*papilio atalanta, cardamines, ægeria*, &c.), field-crickets (*gryllus campestris*), the chaffer or may-bug (*scarabæus melolontha*), and the forest-fly (*hippobosca equina*), which so much annoys horses and cattle. The female wasp (*vespa vulgaris*) appears at the latter end of the month.

Wasps, like bees, associate in great numbers, and construct a common habitation with much dexterity and skill. There are many species of wasps, some of which unite into societies, and others spend their lives in perfect solitude. We shall confine our attention to the operations of the common associating wasp, an insect so well known, even to children, that it requires no description. Though bees, as well as wasps, are armed with a sting, yet the former may be regarded as a placid and harmless race. Bees are continually occupied with their own labours: their chief care is to defend themselves; and they never take nourishment at the expense of any other animal. Wasps, on the contrary, are ferocious animals, that live entirely on rapine and destruction. They kill and devour every insect that is inferior to them in strength. But, though warlike and rapacious in their general manners, they are polished and peaceable among themselves. To their young they discover the greatest tenderness and affection. For

their protection and conveniency no labour is spared; and the habitations they construct do honour to their patience, their address, and their sagacity. Their architecture, like that of the honey-bee, is singular, and worthy of admiration; but the materials employed furnish neither honey nor wax. Impelled by an instinctive love of posterity, with great labour, skill, and assiduity, they construct combs, which are composed of hexagonal or six-sided cells. Though these cells are not made of wax, they are equally proper for the reception of eggs, and for affording convenient habitations to the worms which proceed from them, till their transformation into wasps.

In general, the cells of the wasps are formed of a kind of paper, which, with great dexterity, is fabricated by the animals themselves. The number of combs and cells in a wasp's nest is always proportioned to the number of individuals associated. Different species choose different situations for building their nests. Some expose their habitations to all the injuries of the air; others prefer the trunks of decayed trees; and others, as the common kind, conceal their nests under ground. The hole which leads to a wasp's nest is about an inch in diameter. This hole is a kind of gallery mined by the wasps, is seldom in a straight line, and varies in length from half a foot to two feet, according to the distance of the nest from the surface of the ground. When exposed to view, the whole nest appears to be of a roundish form, and sometimes above twelve or fourteen inches in diameter. It is strongly fortified all round with walls or layers of paper, the surface of which is round and irregular. In these walls, or rather in this external covering, two holes are left for passages to the combs. The wasps uniformly enter the nest by one hole, and go out by the other, which prevents any confusion or interruption to their common labours.

This subterraneous city, though small, is extremely

populous. Upon removing the external covering, we perceive that the whole interior part consists of several stories or floors of combs, which are parallel to each other, and nearly in a horizontal position. Every story is composed of a numerous assemblage of hexagonal cells, very regularly constructed with a matter resembling ash-coloured paper. These cells contain neither wax nor honey, but are solely destined for containing the eggs, the worms which are hatched from them, the nymphs, and the young wasps till they are able to fly. Wasps' nests are not always composed of an equal number of combs: they sometimes consist of fifteen, and sometimes of eleven only. The combs are of various diameters. The first, or uppermost, is often only two inches in diameter, while those of the middle sometimes exceed a foot. The lowest are also much smaller than the middle ones. All these combs, ranged like so many floors or stories, afford lodging to prodigious numbers of inhabitants. Reaumur computed, from the number of cells in a given portion of comb, that, in a medium-sized nest, there were at least 10,000 cells. This calculation gives an idea of the astonishingly prolific powers of these insects, and of the vast numbers of individuals produced in a single season from one nest; for every cell serves as a lodging to no less than three generations. Hence a moderately-sized nest gives birth annually to 30,000 young wasps.

The different stories of combs are always about half an inch high, which leaves free passages to the wasps from one part of the nest to another. These intervals are so spacious, that, in proportion to the bulk of the animals, they may be compared to great halls, or broad streets. Each of the larger combs is supported by about fifty pillars, which, at the same time, give solidity to the fabric, and greatly ornament the whole nest. The small combs are supported by the same ingenious contrivance. These pillars are

coarse, and of a roundish form. Their bases and capitals, however, are much larger in diameter than toward the middle. By the one end they are attached to the superior comb, and by the other to the inferior. Thus, between two combs there is always a species of rustic colonnade. The wasps begin at the top, and build downward. The uppermost and smallest comb is first constructed: it is attached to the superior part of the external covering. The second comb is fixed to the bottom of the first; and, in this manner, the animals proceed till the whole operation is completed. The connecting pillars are composed of the same kind of paper as the rest of the nest. To allow the wasps entries into the void spaces, roads are left between the combs and the external covering.

The female glow-worm (*lampyris noctiluca*) is now seen on dry banks, about woods, pastures, and hedge-ways, exhibiting, as soon as the dusk of the evening commences, the most vivid and beautiful phosphoric splendour, in form of a round spot of considerable size.

When evening closes nature's eye,
The glow-worm lights her little spark,
To captivate her favourite fly,
And tempt the rover through the dark.

Conducted by a sweeter star
Than all that deck the fields above,
He fondly hastens from afar,
To sooth her solitude with love. MONTGOMERY.

About this time, bees send forth their early swarms. Nothing can afford greater amusement than to watch the members of this industrious community in their daily journies from flower to flower.

Not a flow'r can be found in our fields,
Or the spot that we till for our pleasure,
From the largest to least, but it yields
The bee, never wearied, a treasure.

About the commencement of the month, the flowers of the lily of the valley (*convallaria maialis*) and

the chesnut tree (*fagus castanea*) begin to open; the tulip tree (*liriodendron tulipfera*) hath its leaves quite out, and the flowers of the oak (*quercus robur*), the Scotch fir (*pinus sylvestris*), the honey-suckle, and the beech, are in full bloom. Towards the middle, the flowers of the white thorn are quite out, and the mulberry tree (*morus nigra*) puts forth its leaves; the walnut (*juglans regia*) hath its flowers in full bloom; the flowers of the garden rose[1] also begin to open. The lilac (*syringa vulgaris*), the barberry (*barberis vulgaris*), and the maple (*acer campestre*), are also in flower. At the latter end of the month, rye (*secale hybernum*) is in ear; the mountain ash (*sorbus aucuparia*), laburnum (*cytisus laburnum*), the guelder rose (*viburnum opulus*), clover (*trifolium pratense*), columbines (*aquilegia vulgaris*), the alder (*rhamnus frangula*), and the wild chervil (*chærophyllium temulum*), have their flowers full blown.

The germander (*veronica chamædrys*) is seen in hedges, and various species of meadow-grass are now in flower. Hearts-ease (*viola tricolor*) in corn-fields; the butter-cup (*ranunculus bulbosus*) spread

[1] The fiction in Herrick's 'Funeral Rites of the Rose' is so truly original and beautifully simple, that we cannot withhold it from our readers:—

The rose was sick, and smiling died;
And, being to be sanctified,
About the bed there sighing stood
The sweet and flow'ry sisterhood:
Some hung the head; while some did bring,
To wash her, water from the spring;
Some laid her forth; while others wept;
But all a solemn fast there kept.
The holy sisters some among
The sacred dirge and trental sung:
But ah, what sweets smelt every-where,
As heav'n had spent all perfumes there!
At last, when prayers for the dead,
And rites were all accomplished;
They, weeping, spread a lawny loom,
And closed her up as in a tomb.

over the meadows; the cole-seed (*brassica napus*) in cornfields; bryony (*bryonia dioica*), and the arum or cuckoo-pint, in hedges, now show their flowers.

In this and in the succeeding month, nothing so much attracts our attention as the order of succession and infinite variety of flowers; which have not only furnished the poets with inexhaustible description, but the philosophers, in every age, with a variety of moral sentiment. A more beautiful example of this, perhaps, cannot be given than the 'Ut flos in septis' of Catullus, so familiar to every classical reader. The following is an exquisite translation, or rather imitation, by Mr. Brand:

A tender maid is like a floweret sweet,
Within the covert of a garden born;
Nor flock, nor hind, disturb the calm retreat,
But on the parent stalk it blooms untorn,
Refreshed by vernal rains and gentle heat,
The balm of evening and the dews of morn:
Youths, and enamoured maidens, vie to wear
This flower, their bosom's grace, or curled around their hair:
No sooner gathered from the vernal bough,
Where fresh and blooming to the sight it grew,
Than all who marked its opening beauty blow,
Forsake the tainted sweet and faded hue.
And she who yields, forgetful of her vow,
To one but newly loved, another's due,
Shall live (though high for heavenly beauty prized),
By youths unhonoured, and by maids despised[1].

The *marine* plants which flower this month, and which are chiefly found on sea-shores and in the crevices of rocks, are, buck's horn (*plantago coronopus*), which flowers the whole summer; burnet saxifrage (*pimpinella dioica*), sea arrowgrass (*triglochin. maritimum*) on muddy shores; the clammy lychnis (*lychnis viscaria*), the cerastium tetrandrum; scurvy grass (*cochlearia*), sea-kale (*crambe maritima*) on sandy shores; the sea-cabbage (*brassica oleracea*), the sea stork's bill (*erodium maritimum*), the slender

[1] 'Four Slaves of Cythera,' canto iv, stanza 50, 51.

bird's foot trefoil (*lotus diffusus*), the mountain fleawort (*cineraria integrifolia*) on chalky cliffs; and the sedge (*carex arenaria*) on sea-shores.

The leafing of trees, which is usually completed in May, takes place in the following order: (1) The willow, poplar, alder, and other aquatics; (2) The lime, sycamore, and horse-chesnut; (3) The oak, beech, ash, walnut, and mulberry; but the whole of the third number are not in full leaf till next month.

Mr. Stillingfleet, in his Tracts (p. 142), gives the following as the order of the leafing of trees and shrubs, as observed by him in Norfolk: *January* 15, Honey-suckle. *March* 11, gooseberry, currant, elder. *April* 1, birch, weeping-willow; 3, raspberry, bramble; 4, briar; 6, plum, apricot, peach; 7, filberd, sallow, alder; 9, sycamore; 10, elm, quince; 11, marsh elder; 12, wych elm; 13, quicken tree, hornbeam; 14, apple tree; 16, abele, chesnut; 17, willow; 18, oak, lime; 19, maple; 21, walnut, plane, black poplar, beech, acacia robinia; 22, ash, carolina poplar.

Cattle are usually sent to the pastures on old May day; and the juices of the young springing grass contribute to render the milk of the cows more abundant and of a finer quality. The *dairy* now occupies attention.

> The full-charged udder yields its willing streams,
> While *Mary* sings some lover's amorous dreams,
> And crouching *Giles*, beneath a neighbouring tree,
> Tugs o'er his pail and chants with equal glee.

This is the season in which cheese is made; the counties most celebrated for this article are Cheshire, Wiltshire, and Gloucestershire.

The corn is benefited by a cold and windy May, as it is too apt to run into stalk, if the progress of vegetation be much accelerated by warm weather at this season. In late years, some sowing remains to be done; and in forward ones, the weeds should be well kept under.

JUNE.

THE Saxons called June, *weyd-monat*, because their beasts did then *weyd* or feed in the meadows.

Remarkable Days.

1.—NICOMEDE.

NICOMEDE was a pupil of St. Peter, and was discovered to be a Christian by his burying Felicula, a martyr, in a very honourable manner. He was beaten to death by leaden plummets, on account of his religion, in the reign of Domitian.

This day is kept by the *Jews* in remembrance of their being prevented by Jeroboam from bringing up the first fruits to Jerusalem.

On the 3d, the *Jews* commemorate the death of Rabbi *Simeon*, son of *Gamaliel*, and also that of *Rabbi Hananiah*, burnt alive by the Romans and the Law with him.

4.—KING GEORGE III *born*.

5.—SAINT BONIFACE.

Boniface was a Saxon presbyter, born in England, and at first called Winfrid. He was sent as a missionary by Pope Gregory II into Germany, where he made so many converts, that he was distinguished by the title of the *German Apostle*. He was created Bishop of Mentz in the year 145. Boniface was one of the first priests of his day, and was also a great friend and admirer of the venerable Bede. He was murdered in a barbarous manner by the populace near Utrecht, while preaching the Christian religion.

11.—SAINT BARNABAS.

Our saint's proper name was *Joses;* he was descended of the tribe of Levi, and born at Cyprus. His parents being rich, had him educated at Jerusalem, under the care of Gamaliel, a learned Jew; and, after his conversion, he preached the Gospel

with Paul, in various countries, for fourteen years. Barnabas suffered martyrdom at Salamis, in his native island:—being shut up all night in the synagogue by some Jews, he was, the next morning, cruelly tortured, and afterwards stoned to death. The *Epistle* which he wrote is considered genuine, though not admitted into the canon of the church.

On the 14th and 15th of June, answering to the sixth and seventh of the month Sivan, the *Jews* celebrate *Shevooth*, or the Feast of Weeks, so called from its being reckoned by the weeks; that is, seven full and complete weeks from the second day of Passover, according to Leviticus xxiii, verse 9 to 22, and Deuteronomy xvi, 9.—The Jews on the 50th day were to bring a sheaf offering of the first of the harvest, and also two loaves of fine new flour for an offering; but as they are forbidden to offer any sacrifice out of the Holy Temple of Jerusalem, they now omit the 50th day, and only count 49, which they call *Sephiroth Omer*. The first day of *Shevooth* is celebrated as that on which God gave his law from Mount Sinai. Exodus, chapter xix.

17.—SAINT ALBAN.

St. Alban, the first Christian martyr in this island, suffered in 303. He was converted to Christianity by Amphialus, a priest of Caerleon in Monmouthshire, who, flying from persecution, was hospitably entertained by St. Alban at Verulam, in Hertfordshire, now called from him St. Albans. Amphialus being closely pursued, made his escape, dressed in St. Alban's clothes. This, however, being soon discovered, exposed St. Alban to the fury of the Pagans; and our saint refusing to perform the sacrifice to their gods, was first miserably tortured, and then put to death.

20.—TRANSLATION OF EDWARD, *King of the West Saxons.*

Edward, being barbarously murdered by his mother-in-law, was first buried at Warham, without

any solemnity; but, after three years, was carried by Duke Alferus to the minster of Shrewsbury, and there interred with great pomp.

21.—LONGEST DAY.

This day is, in London, 16 h. 34 m. 5 s., allowing 9 m. 16 s. for refraction. See also p. 208.

24.—SAINT JOHN THE BAPTIST, *and* MIDSUMMER DAY.

This festival is first noticed by Maximus Tauricensis, who lived about the year 400. According to Bourne, strange divinations were formerly used on the vigil of this day: 'Men and women were accustomed to gather together in the evening by the sea side, or in some certain houses, and there adorn a girl, who was her parent's first begotten child, after the manner of a bride. Then they feasted, and leaped after the manner of bacchanals, and danced and shouted as they were wont to do on their holidays; after this they poured into a narrow-necked vessel some of the sea water, and put also into it certain things belonging to each of them; then, as if the devil gifted the girl with the faculty of telling future things, they would inquire with a loud voice about the good or evil fortune that should attend them: upon this the girl would take out of the vessel the first thing that came to hand, and show it, and give it to the owner, who, upon receiving it, was so foolish as to imagine himself wiser as to the good or evil fortune that should attend him.'—See also T.T. for 1814, pp. 142-146.

29.—SAINT PETER.

Peter's original name, Simon, was not abolished by Christ, but that of *Cephas* was added to it, which in Syriac, the vulgar language of the Jews, signifies a stone or rock; hence the Greek Πέτρος, and our *Peter*. The apostle's father was Jonah, probably a fisherman of Bethsaida. His brother Andrew, being first converted, was said to be an instrument of Peter's conversion, *John* i, 40, 41.

Astronomical Occurrences.

Eclipses.

[Continued from p. 184.]

AN eclipse of the Sun can only take place when the Moon is in conjunction with the Sun, and when she is in or near one of the nodes.

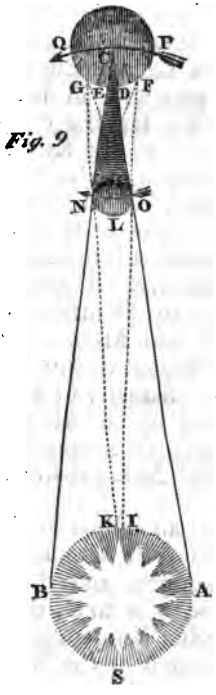


Fig. 9

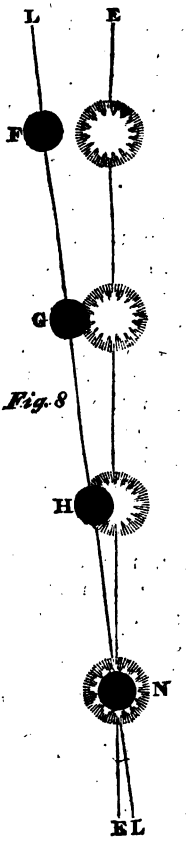


Fig. 8

Suppose the line EE, *fig.* 8, to be a portion of the ecliptic, and LL a portion of the orbit of the Moon, cutting the ecliptic in the point N, at an angle of little more than five degrees. Then if, in the moment of her conjunction, the Moon is found in the point F of her orbit, she will be too far from her node to intercept the Sun's light, and cause an eclipse; but, if she is in the point G, having less latitude, she will hide a portion of the disk of the Sun, and will then produce a partial eclipse, which will be still greater if the Moon be nearer her node, as in the point H. If, in the moment of the conjunction, the Moon is precisely in her node N, the eclipse will be central; for the centre of the Moon, if viewed from that of the Earth, will appear to coincide with the centre of the Sun. If the apparent diameter AB (*fig.* 9) of the Sun S is greater than the apparent diameter of the Moon L, it will form round the Moon a luminous ring, and the eclipse is said to be annular. This ring of light will be larger in proportion to the difference between the diameters of the Sun and Moon. But, if the apparent diameter of the Moon is equally great or greater than the apparent diameter of the Sun, he will appear entirely covered by the Moon, and the eclipse will be total, and will last so much longer, as the apparent diameter of the Moon shall exceed that of the Sun.

It is ascertained that, for an eclipse of the Sun to be annular, the most favourable circumstance will be when the Sun is in perigee, and the Moon in apogee; and, for an eclipse to be total, the most favourable case is when the Sun is in apogee, and the Moon in perigee. The motion of the Moon being much swifter than that of the Earth, and the motions of both being directed from west to east, that is (*figure* 9), from N to O, an eclipse of the Sun must always begin in the western edge of the Sun A; and as the Moon is a great deal less than

the Earth, her shadow forms a cone NOC, the section of which is much less than the Earth, so that a small portion of the Earth only can, at any time, be involved in the shadow at one time. Hence it is, that an eclipse of the Sun is not perceived, at the same instant, in every part of the hemisphere that is turned towards the Sun, and that, in some parts, it will not be seen at all. Again, in different situations, different parts of the Sun's disk will appear eclipsed, for those who are at F will see him eclipsed in the part IB, and those who are at G will see him eclipsed in the part KA. But, on the contrary, an eclipse of the Moon is perceived, at the same moment, in every part of the Earth where this planet is visible, and appears every where to occupy the same portion of her disk. Hence, eclipses of the Sun are much less frequent in any particular place than eclipses of the Moon.

If the nodes of the Moon constantly corresponded with the same points in the heavens, the eclipses of the Sun or Moon might be expected in the same months, and even on the same days; but, as the nodes shift backwards, or contrary to the Earth's annual motion, about 19½ degrees in a year, the same node will come round about 19 days sooner every year than in the preceding. From the time, therefore, when the ascending node passes by the Sun, as seen from the Earth, there will be only 173 days before the descending nodes passes by him. If, then, at any time of the year, we have eclipses about either of the nodes, their return may be expected in about 173 days, in or near the other.

It may be further observed, that, after the Sun, Moon, and nodes, have been once in a line of conjunction, they will return nearly to the same state again in 228 lunations, or 18 years and 10 days; so that the same node which was in conjunction with the Sun and Moon at the beginning of the first of these lunations, will be within less than half a de-

gree of the line of conjunction with the Sun and Moon again, when the last of these lunations is completed: in that time, therefore, there will be a regular period of eclipses for many ages.

These things being properly considered, it will not be difficult to conceive how astronomers are able to foretel the exact time when any phenomenon of this kind will happen: for, as an eclipse can only take place at the time of a new or full Moon, the principal requisites are to determine the number of mean conjunctions and oppositions that will happen every year, and the true places of the Sun and Moon in their orbits at each of those times. And if, from this, when proper calculations have been made, it appears that the two luminaries are within the proper limits of the nods, there will be an eclipse. To facilitate these operations, we have astronomical tables ready computed, by which the places of the heavenly bodies, and every other particular required, may be easily found for any given instant of time.

The principal eclipse of the Sun, for the present century, has been already calculated, and it is fully determined that it will take place in the year 1847. It will be annular in this country, and several other places.

In all eclipses, whether of the Sun or Moon, there are three points particularly to be observed—the beginning, the middle, and the end; and every precaution is taken to note the precise moment of each of these three phases. In total eclipses there are two other phases to be observed; these are the total immersion and the commencement of the emersion. In total eclipses, then, there are five phases to be observed,—the commencement of the immersion, which is the commencement of the eclipse; the total immersion; the middle of the eclipse; the commencement of the emersion; and the total emersion, which is the end of the eclipse.

There is also another circumstance to be observed in every eclipse, namely, its greatness or extent; that is, the portion of the luminary eclipsed, or which is covered by the shadow. To measure this, the diameters of the Sun and Moon are supposed to be divided into twelve equal parts, which are called digits; and an eclipse is said to be so many digits, according to the number of those parts which are obscured. In total eclipses of the Moon, the face is often said to be eclipsed more than twelve digits, though the diameter of the Moon is only estimated at that number. The expression then implies, that the Earth's shadow is measured as if it was a part of the luminary eclipsed. The satellites of Jupiter are very frequently eclipsed. They revolve very rapidly round the planet; their orbit is very little inclined to that of Jupiter; and the mass of each of them very small, compared with that of the planet. It happens, therefore, that at each revolution they are necessarily plunged in the shadow of the planet, in other words eclipsed. As it happens that these eclipses, from the great distance of Jupiter, can be perceived at different parts of the Earth at the same instant, they afford a certain and very common method of ascertaining, with exactness, the difference of the meridians of these different places, and, consequently, their relative longitudes. There are two points to be principally attended to in the eclipses of Jupiter's satellites, viz. the immersion of the satellite in the shadow, and its emersion.

When the Moon, during her motion from east to west, passes over any planet or fixed star, so as to hide it from the inhabitants of the Earth, the phenomenon is called an *occultation* of the star or planet. As all the planets, whatever be the inclination of their orbits, must occasionally approach the ecliptic or orbit of the Earth, and consequently be in the vicinity of the Moon's orbit, all of them may suffer an occultation by the Moon; but it is only those

fixed stars which lie in the Moon's path that can be eclipsed by that luminary. All those stars, whose latitudes do not exceed 6° 36′, may suffer an occultation somewhere on the Earth; and, if their latitudes do not exceed 4° 32′, they may undergo an occultation to the people on any part of the Earth. In order to know if an occultation will happen, we must find the time when the longitude of the Moon is the same with the longitude of the stars; and if the difference between the Moon's latitude and that of the stars should exceed about a degree and a half, no occultation can take place. If the difference be less than 57′, an occultation must take place to some parts of the Earth. The most remarkable stars that can suffer an occultation by the Moon, or to which the Moon can make a near appulse, are as follow:

δ,	Aries
α, β, γ, ε, ζ, η,	Taurus
β, γ, δ, ε, η, μ,	Gemini
γ, δ,	Cancer
α, η, ξ, ο, ρ, τ, υ,	Leo
α, γ, η, θ, η, λ,	Libra
α, β, δ, ν, π, σ, τ,	Scorpio
γ, λ, μ, ο, π, σ, τ, φ,	Sagittarius
β, γ, δ, ε,	Capricornus
θ, ι, λ, φ,	Aquarius
δ, ε, ζ,	Pisces.

Table of the Sun's Rising and Setting, every 10th Day:

		h.	m.			h.	m.
Thursday	1st, Sun rises	3	53	- Sets		8	7
Sunday	11th, - - -	3	46	- - -		8	14
Wednesday	21st, - - -	3	43	- - -		8	17

The 21st is marked in the calendars as the longest day, but it does not vary in length from the 18th to the 26th, both inclusive; and the variations for three days before, and as many after these, is but a single minute.

Table of the Equation of Time, for every 5th Day. [See January.]

			m.	s.
Thursday	1st, from the time on the dial	*subtract*	2	42
Tuesday	6th,		1	54
Sunday	11th,		0	58
Friday	16th, to	*add*	0	3
Wednesday	21st,		1	7
Monday	26th,		2	11

The Sun enters Cancer at 9 o'clock in the morning of the 21st.

The new Moon happens at 53 m. past 3 in the afternoon of the 7th. She enters her first quarter at 53 m. past 7 on the 13th; is full at 6 o'clock of the 21st, and enters her last quarter at 41 m. past 9 of the 29th.

The Moon is eclipsed on the 21st, but invisible in this country. The Moon eclipses Mercury on the 9th, at 57 m. past 1 in the morning; and it eclipses Venus at 41 m. past midnight on the 9th.

The Moon may be seen on the meridian on the

19th	day at	32 m. past	10 in the evening.
20th	- -	28 - -	11
21st	- -	18 - -	12

Table of the Eclipses of Jupiter's first Satellite. The calculations refer to the emersions.

4th	day at	38 m. after	9 in the evening.
11th	- -	32 - -	11
27th	- -	30 - -	9

Mercury's greatest elongation takes place on the 25th. Mars is in his quadrature at 12 at night on the 12th, and Jupiter is in his quadrature at ¾ past 5 in the afternoon of the 23d.

HISTORY OF ASTRONOMY.

[Continued from p. 198.]

Galileo, to whose labours and sufferings we have before referred, who, at the solicitation of the Grand

Duke of Tuscany, realeased after a year's imprisonment, but he was compelled to remain within the territory of Florence, in a small village. In this state of captivity he endeavoured to console himself by renewing his former studies. He observed the phenomena of the Moon's libration, and ascribed them to the position of the observer on the surface of the Earth, and to the motion of the Moon, in an orbit which was inclined to the ecliptic. He did not cease to observe the motions of Jupiter's satellites, and he proposed a method of finding the longitude, by comparing the times in which they appeared on different meridians. The government of the United Provinces heard of his fame, and of his proposal, and sent Hortensius and Bleau to consult with Galileo on the subject. They carried with them, as a mark of distinction and a token of respect for his talents, a golden chain, to present him with; but they found the philosopher deprived of his sight, and not much alive to the honours intended for him. He continued his studies some time after, and died in January 1642, in the seventy-eighth year of his age.

At this period there were many astronomers who greatly enlarged the boundaries of science. Lord Napier had thirty years before published his Tables of Logarithms. Bayer had obtained great celebrity by his 'Uranometria', in which the stars are designated by the letters of the Greek alphabet. Horrox and Crabtree had enjoyed the felicity of observing Venus on the Sun's disk: and Gassendi had noticed the transit of Mercury over the Sun in 1631. Numerous observations had been made on the spots of the Sun: Riccioli had published a work entitled 'Almagestum Novum.' Azout had invented the micrometer with a moveable wire; and the diameters of the Sun and Moon had been ascertained by means of the telescope and pendulum.

The labours of Hevelius were of great importance to the science of astronomy. His observatory, founded

at Dantzic in 1641, was furnished with excellent instruments, some of which were divided into portions of five seconds. His observations on the spots and libration of the Moon are published in his 'Selenographia.' He was likewise a diligent observer on the spots of the Sun, considered attentively the nature of the comets, and made a catalogue of 2000 stars, which was the result of his own accurate observations. Hevelius lost, in 1679, his observatory, with all the books and instruments which it contained, but descriptions and drawings of his instruments were fortunately preserved in his 'Machina Celestis.'

The improvement of the telescope continued to lay open new sources of discovery. Huygens, by means of two telescopes, discovered that the singular appearance which Saturn had exhibited to Galileo and Hevelius was occasioned by a large ring which surrounded the planet; that the plane of the ring was inclined 30° to the ecliptic: and that the various appearances which the ring exhibited arose from the different position of the Earth with regard to this plane. He discovered also the fourth satellite of Saturn, and as this discovery made the number of secondary planets equal to the primary ones, Huygens imagined that there were no more satellites to discover, and, taking up this idea, he probably did not explore the heavens with the care and attention that he otherwise would. To M. Huygens we are indebted for the application of pendulums to clocks, an invention that has been of great utility in practical astronomy. His beautiful theorems on the centrifugal and centripetal forces, and his other discoveries, paved the way for Sir Isaac Newton's theory of curvilineal motion. The reputation of Huygens obtained for him an invitation from Louis XIV, and he became one of the earliest members of the French academy. Huygens was, however, a Protestant, and was, upon the cruel revocation of the edict of Nantes,

compelled to retire to the Hague, his native place. By the same illiberal policy, France was deprived of multitudes of her most valuable citizens.

It was about this time that the establishment of learned societies in London and Paris concentrated much of the genius of Europe. The enthusiasm which they inspired, the encouragements which they held out, the rivalry which they produced, were the causes of that rapid advancement which all the sciences experienced.

Among the number of philosophical strangers whom the generosity of Louis XIV, and his minister Colbert, had attracted to Paris, were Cassini and Roemer. When the former of these was professor of astronomy at Bologna, he constructed an accurate table of refractions, and new tables of the Sun's motions. He discovered the diurnal revolutions of Jupiter, Mars, and Venus. By observing the immersions and emersions of Jupiter's satellites, he formed a complete theory of these bodies, and published tables for calculating their eclipses. Between the years 1671 and 1684, he discovered the 1st, 2d, 3d, and 5th satellites of Saturn: he ascertained the rotation of the 5th satellite on its axis, and he observed a belt upon Saturn, and the space which divides the ring into two equal parts. He discovered that the figure of Jupiter was spheroidal, and that the polar was to the equatorial diameter as 14 to 15. Cassini likewise formed a complete theory of the Moon's librations, and ascertained that the belts on Jupiter's surface are parallel to the equator; and in 1683 he discovered the zodiacal light, to be hereafter described.

The successive propagation of light, one of the most curious discoveries in the science of astronomy, was about this period ascertained by Roemer, a Danish astronomer. It was by comparing the eclipses of the first satellite of Jupiter with the times of their emersions and immersions, given by the tables of

Cassini, that he found that the error of the tables depended on the distance between Jupiter and the Earth; and hence he was led to conclude that the motion of light was not instantaneous, and that it moved through the length of the whole orbit of the Earth in a certain number of minutes.

About this time there flourished a number of persons, who, if they are not to be ranked with philosophers of the first class, ought not, nevertheless, to be wholly overlooked. Dr. Hooke was unquestionably one of the most ingenious mechanics of his age. He invented the zenith sector, in order to determine if the Earth's orbit had any sensible parallax: he suggested the first hint of making a quadrant by reflexion; and he anticipated the discoveries of Newton, when he showed that the motion of the planets resulted from the projectile force combined with the attractive power of the Sun. M. Picard was one of the first who applied telescopes to quadrants, and in 1669 he determined the Earth's diameter, by measuring a degree of the meridian in France.

M. Richer made a number of astronomical observations at Cayenne, where he found that a pendulum to beat seconds must be more than a line shorter than one which beat them at Paris. This singular fact at first scarcely obtained credit: it was sent to Paris, and the penetrating mind of Huygens almost instantly ascribed it to the diminution of the power of gravity at the equator by means of the centrifugal force, and, having formed the theory, he immediately set about calculating the spheroidal form of the Earth.

[To be continued.]

The Naturalist's Diary.

O June! prime season of the annual round,
Thy gifts with rich variety abound;
Though hot thy suns, they luscious fruits mature;
Though loud thy thunders, coolness they procure;
Blessing thy twilight to the studious muse,
Thy evening coolness, and thy morning dews.

Warm weather is, generally, established in June, yet the heat is rarely excessive:—showers of rain are very acceptable at the commencement of the month, as they tend to promote the growth of the young herbage.

The fields of clover (*trifolium pratense*), which are now in blossom, produce a delightful fragrance. Of this plant there are two varieties, the white and the purple: from the latter the bees extract much honey. The bean blossoms also shed a still more exquisite odour.

Among the insect tribe, one of the most interesting is, in its perfect state, the angler's may-fly (*ephemera vulgata*), which appears about the 4th, and continues nearly a fortnight. It emerges from the water, where it passes its aurelia state, about six in the evening, and dies about eleven at night. Innumerable species of insects are called into life by the heat in this month.

Among the most remarkable insects at this season may be named the grasshopper (*gryllus*), the golden-green beetle (*scarabæus aurulus*), various kinds of flies, the cuckoo-spit insect (*cicada spumaria*), and the stag-beetle (*lucanus cervus*).

The *cuckoo-spit* insect is so named from the circumstance of its producing, during its immature state, the white froth so common on various plants in the summer season, and popularly known by the name of cuckoo-spittle. During this its immature state, the animal continues to suck with its proboscis the juice of the plant on which it resides, discharging

it at intervals from the hind part of its body, in the form of very minute glutinous bubbles, and, by continuing this operation, completely covers itself under a large mass of white froth. When arrived at its full growth, it measures about the fifth of an inch in length, and is of a beautiful pale green colour: it now casts its skin, and appears in its perfect state, when the wings (of which the rudiments only were apparent before) are very conspicuous: the whole insect is now of a pale brown colour, with a pair of pale or whitish bands across the wings. In this state it is often called by the name of the frog-hopper, from a fancied resemblance to the general shape of that animal in miniature. These insects breed in the month of September, and deposit their eggs towards the beginning of October, which, however, do not hatch till the following spring.—(*Dr. Shaw's Nat. Pocket-Book for* 1813.)

The *stag-beetle* is the largest European insect of the beetle tribe, sometimes measuring three inches in length from the tips of the horn-shaped jaws to that of the body. Its colour is black, but the wing-sheaths and jaws are of a deep chesnut, the latter sometimes strongly tinged with red. This remarkable insect is chiefly found in the neighbourhood of oaks and ashes, delighting to feed on the sweet exudation or honey-dew so often seen on the leaves of those trees. It proceeds from a large grub or caterpillar, residing in the soft decayed wood and vegetable mould in the hollows of those trees. This grub, except in its far greater size, extremely resembles that of the cock-chaffer, so common in ploughed fields; it is of a pale or yellowish white colour, with a reddish brown head, and, when fully extended, measures more than three inches in length. When arrived at its full size, which is said by some, to be not sooner than its fourth or fifth year, it conceals itself in an oval ball, formed of the mould and soft wood in which it resides, and in this cavity it changes into a chrysalis, when the limbs of the future beetle are dis-

tinctly observable; the chrysalis remains thus inclosed for about three months, when the animal proceeds from it in its complete or perfect state. After this the female deposits her eggs in similar situations, in order to give birth to a future race.—(*Dr. Shaw's Nat. Pocket Book for* 1813.)

The several species of the gad-fly (*œstrus bovis—equi*—and *ovis*), the ox, horse, and sheep gad-fly, make their appearance in this month. The female of this genus is remarkable for the manner in which she deposits her eggs: having fastened on the back of a heifer or cow, by means of a tube she pierces its skin in several places, inserting an egg at each puncture. This operation is not performed without severe pain to the animal on which it is practised, and it is for this reason that cattle are observed to be seized with such violent horror when apprehensive of the approaches of the female œstrus; flying with uncontrollable rapidity, and endeavouring to escape their tormentor by taking refuge in the nearest pond; it being observed that this insect rarely attacks cattle when standing in the water. The practice of docking horses, or depriving them of their tails, is, in many cases, both cruel and unnecessary, and takes away the only weapon with which they can combat the approaches of their insidious enemy.

About the beginning of the month, the pimpernel (*anagallis arvensis*), thyme (*thymus serpyllum*), the bitter sweet nightshade (*solanum dulcamara*), white bryony, the dog rose (*rosa canina*), and the poppy (*papaver somniferum*), have their flowers full blown; and the fern owl may be seen, in the evening, among the branches of oaks, in pursuit of its favourite repast, the fern-chaffer (*scarabæus solstitialis*).

Towards the middle of the month, wheat is in ear, and the flowers of the valerian (*valeriana officinalis*) begin to open. Mullein, viper's bugloss (*echium vulgare*), borage, dog-wood, vervain, the vine (*vitis vinifera*), water hemlock (*phellandrium aquaticum*),

and that singular plant the bee orchis, have their flowers full blown.

The summer solstice happens on the 21st of June, which is the longest day. In the most northern parts of the island, there is scarcely any night at this time; so that a person may read with ease at twelve o'clock at night; the twilight continuing almost from sun-rise to sun-set.

The following plants are generally seen in flower about the end of June; goats-beard (*tragopogon pratense*), deadly nightshade (*atropa belladonna*), meadow-sweet (*spiræa ulmaria*), the day-lily (*hemerocallis flava*), the jasmine (*jasminum officinale*), and the holy-oak (*alcea rosea*).

The several kinds of corn come into ear and flower during this month, as well as most of the numerous species of grasses: gooseberries, currants, and strawberries, also begin to ripen. The hay harvest commences about the end of the month, in the southern and midland parts of the kingdom. About this time, also, birds cease their notes.—I heard no birds after the end of June (says Mr. Stillingfleet), except the stone curlew (*charadrius œdicnemus*) whistling late at night; the yellow hammer, goldfinch, and golden-crested wren, now and then chirping. The cuckoo's note also ceases. The rural employment of *sheep-shearing* commences sometimes early in June, but at others not till the middle of the month, the time being regulated by the warmth and settled state of the weather. In many parts of the country the depriving sheep of their wool is conducted with much ceremony and rural dignity.

Much amusement may be derived from an attentive observation of the common white or barn owl during the mild evenings of this month.[1]

Mackerel (*scomber, scomber*) are taken in great

[1] See T. T. for 1814, p. 162.

abundance in this month. Such is sometimes the profusion of this fish, that a single boat has been known to take 120,000. The price on the spot, to those who purchased them for sale, was half a guinea per thousand.

The *maritime plants* which flower this month are the sea-barley (*hordeum maritimum*), sulphur-wort (*pucedanum officinale*), and loose sedge (*carex distans*), in salt marshes; the sea-plantain (*plantago maritima*), among rocks on the sea coast; the slender-leaved buffonia (*buffonia tenuifolia*), and the tassel pond-weed (*ruppia maritima*), in salt-water ditches. To these may be added, the common alkanet (*anchusa officinalis*), the narrow-leaved pepperwort (*lepidum ruderale*), and the Roman nettle (*urtica pilulifera*), in sea wastes; the black salt-wort (*glaux maritima*), on muddy shores; the sea-chickweed (*arenaria peploides*) and the common sea-rocket (*bunias cakile*), on sandy shores; and the perfoliate cabbage (*brassica orientalis*) among maritime rocks.

JULY.

THIS word is derived from the Latin *Julius*, the surname of C. Cæsar, the dictator, who was born in it. Mark Anthony first gave to this month the name of July, which was before called *Quintilis*, as being the fifth month in the year, in the old Roman calendar established by Romulus. July was called by the Saxons *heu-monat*, or *hey-monat*, because therein they usually mowed, and made their hay-harvest.

Remarkable Days.

2.—VISITATION OF THE BLESSED VIRGIN MARY.

THIS festival was first instituted by Pope Urban VI, in commemoration of that remarkable journey

which the Mother of our Lord took into the mountains of Judæa, in order to visit the mother of St. John the Baptist. It was afterwards confirmed, not only by a decree of Pope Boniface IX, but by the council of Basil, in 1441.

3.—DOG-DAYS BEGIN.

These are a certain number of days before and after the heliacal rising of *Canicula*, or the dog-star, in the morning. The dog-days in our modern Almanacks occupy the time from July 3d to August 11th; the name being applied now, as it was formerly, to the hottest time of the year.

4.—TRANSLATION OF ST. MARTIN.

This day was appointed to commemorate the removal or translation of St. Martin's body from one tomb to another much more noble and magnificent; an honour conferred upon the deceased saint by Perpetuus, one of his successors in the see of Tours. His festival is celebrated on the 11th of November, which see.

7.—THOMAS A BECKET.

This haughty prelate was born in London, in the year 1119, and was the son of Gilbert, a merchant, and Matilda, a Saracen lady, who is said to have fallen in love with him, when he was a prisoner to her father in Jerusalem. Thomas received the first part of his education at Merton Abbey in Surrey, whence he went to Oxford, and afterwards studied at Paris. In 1159 he made a campaign with King Henry into Toulouse, having in his own pay 1200 horse, besides a retinue of 700 knights or gentlemen.

'His bridle was of silver, his saddle of velvet, his stirrups, spurs, and bosses, double gilt. His expenses far surpassing the expenses of an Earl. He fed with the fattest, was clad with the softest, and kept company with the pleasantest.

'And the king made him [Becket] his chancellor, in which office he passed the pomp and pride of Tho-

mas [Wolsey] Cardinal, as far as the ones shrine passeth the others tomb in glory and riches. And after that he was a man of war, and captain of 5 or 6000 men in full harness, as bright as St. George, and his spear in his hand; and encountered whosoever came against him, and overthrew the jollyest rutter that was in all the host of France. And out of the field, hot from blood-shedding, was he made bishop of Canterbury, and did put off his helm, and put on his mitre; put off his harness, and on with his robes; and laid down his spear, and took his cross, ere his hands were cold; and so came, with a lusty courage of a man of war, to fight an other while against his prince for the Pope; when his prince's cause were with the law of God and the Pope's clean contrary.' (*Old Tracts cited by Dibdin, in his* 'Bibliomania,' p. 234, *note.*)

From a yet earlier, and perhaps the first printed mention of Becket (says Mr. Dibdin)—and from a volume of which no perfect copy has yet been found,—the reader is presented with a very curious account of the archbishop, in its original dress. 'Than were there iiij. cursed knyghtes of leuing yt thought to haue had a grete thanke of the kyng and mad her a vowe to gedir to sle thomas. And so on Childremasse day all moste at nyghte they come to caunterbury into thomas hall Sire Reynolde beriston, Sire william tracy, Sire richard breton, and Sire hewe morley. Thanne Sire Reynolde beryston for he was bitter of kynde a none he seyde to thomas the king that is be yonde the see sente us to the and bad that thou shuldeate asoyle the bishoppe that thou cursiddiste than seyde thomas seris they be not accursed by me but by the Pope and I may not asoyle that he hath cursid well seyde Reynolde than we see thou wolte not do the kynges byddyng and swore a grete othe by the eyon of god thou shalte be dede. than cryde the othir knyghtes sle sle and they wente downe to the courte and armid hem Thanne prestis and clerkys

drowe hem to the churche to thomas and spered the dores to hem. But whan thomas herde the knyghtes armed and wold come in to the churche and myghte not he wente to the dore and un barred it and take one of the knyghtes by the honde and seyde hil he semythe not to make a castell of holy churche and toke hem by the honde and seyde come ynne my children in goddis name Thanne for it was myrke that they myghte not see nor knowe thomas they seyde where is the traytour nay seyde thomas no traytour but archebishoppe. Thanne one seyde to hym fle fore thou arte but dede. Nay sede thomas y come not to fle but to a byde Ego pro deo mori paratus sum et pro defensione iusticie et ecclesie libertate I am redy to dye for the loue of god and for the fredomme and righte of holy churche Than reynold with his swerdes poynte put off thomas cappe and smote at his hede and cutte of his crowne that it honge by like a dische Than smote a nothir at him and smote hit all of than fill he downe to the grounde on his knees and elbowes and seyde god into thy hondes I putte my cause and the righte of holy churche and so deyde Than the iij knyghte smote and his halfe stroke fell upon his clerkis arme that helde thomas crosse before him and so his swerde fill down to the grounde and brake of the poynte and he seyde go we hens he is deyde And whan they were all at the dore goyng robert broke wente a geyne and sette his fote to thomas necke and thruste oute the brayne upon the pauement. Thus the righte of holoye churche and the lawe of the londe thomas toke his dethe." (*The poke that is callid Festiuall;* 1486, fol. sign. m. iij. as quoted by Mr. Dibdin, in his *Bibliomania*, pp. 234-235, *note.*)

For further particulars respecting Becket we refer to T.T. for 1814, pp. 166-172.

15.—SAINT SWITHIN.

Swithin, in the Saxon *Swithum*, received his clerical tonsure, and put on the monastic habit, in the old

monastery at Winchester. He was of noble parentage, and passed his youth in the study of grammar, philosophy, and the Scriptures. Swithin was promoted to holy orders by Helmstan, Bishop of Winchester, at whose death, in 852, King Ethelwolf granted him the see. In this he continued eleven years, and died in 868. Swithin desired that he might be buried in the open churchyard, and not in the chancel of the minster, as was usual with other bishops; and his request was complied with: but the monks on his being canonized, considering it disgraceful for the saint to lie in a public cemetery, resolved to remove his body into the choir, which was to have been done, with solemn procession, on the 15th of July. It rained, however, so violently for forty days succeeding, that the design was abandoned as heretical and blasphemous, and they honoured his memory by erecting a chapel over his grave, at which many miraculous cures of all kinds are said to have been wrought. To the above circumstance may be traced the origin of the old saying, 'that if it rains on St. Swithin's, it will rain forty days following!'

20.—SAINT MARGARET.

She was born at Antioch, and was the daughter of a Pagan priest. Olybius, president of the East, under the Romans, wished to marry her; but finding that Margaret was a Christian, he postponed his intended nuptials until he could prevail on her to renounce her religion. Our saint, however, was inflexible, and was first tortured, and then beheaded, in the year 278.

22.—MARY MAGDALEN.

This day was first dedicated to the memory of St. Mary Magdalen, by King Edward VI. And in his Common Prayer, the *Gospel* for the day is from St. Luke, chap. vii, verse 36. Our reformers, however, upon a more strict inquiry, finding it doubtful

whether this woman, mentioned in the Gospel, was really Mary Magdalen, thought it prudent to discontinue the festival.

25.—SAINT JAMES.

James was surnamed the *Great*, either on account of his age, being esteemed older than the other *James*, or for some peculiar honour conferred upon him by our Lord. He was by birth a Galilean, and partner with Peter in fishing, from which our Lord called him to be one of his disciples: *Mark* i, 19, 20. Of his ardent zeal no other proof is necessary, than his becoming the victim of Herod Agrippa. The Spaniards esteem James their tutelar saint.

This day is commemorated by the *Jews* on account of Moses breaking the Tables of Stone;—a breach made in Jerusalem during the second Temple;—A. Posthumius, the Roman General, burning the Holy Scriptures, and setting up an idol in the Inner Temple.

26.—SAINT ANNE.

She was the mother of the Virgin Mary, and the wife of Joachim her father. Her festival is celebrated by the Latin church.

Astronomical Occurrences.

Eclipses.

[Continued from p. 208.]

HAVING, in the monthly Occurrences for May and June, given a pretty full illustration of the theory of eclipses, which are always occasioned by a privation of the light of one of the luminaries, by the interposition of some opaque body, either between it and the eye, or between it and the Sun, we shall proceed to make some more general observations on the subject. The antients had frightful ideas of eclipses; supposing them presages of the most dismal events. Plutarch assures us, that, at Rome, it was not allowed to talk publicly of any natural causes of eclipses. They made a great noise with

brazen instruments, and raised loud shouts, during eclipses of the Moon; as thinking, thereby, to ease her in labour: whence Juvenal, speaking of a talkative woman, says, '*Una laboranti poterit succurrere lunæ.*' Others attributed the eclipse of the Moon to the arts of magicians, who, by their enchantments, plucked her out of heaven, and made her skim over the grass. The natives of Mexico keep fast, during eclipses; and particularly their women, who beat and abuse themselves, drawing blood from their arms, &c. They imagine the Moon has been wounded by the Sun, in some quarrel between them.

The Hindoos entertain strange ideas respecting the cause of an eclipse. They say that Rahoo, one of the asoors, stole a draught of the Amceta, at the churning of the ocean, and was discovered in the act by the Sun and Moon, who immediately revealed it to the soors. He was instantly cut in two by Narian: after which his head flew to the heavens, and continues to this day, endeavouring to eat the Sun and the Moon, in revenge for telling of the theft. This causes the eclipse! When the eclipse begins, the people begin to shout and drum to frighten him away, lest he should swallow the luminary. In 1797, during an eclipse, one of Mr. Fountain's servants (the missionary) told him very seriously, he remembered, when a boy, that Rahoo had swallowed the Moon; but the people made such a great noise while he was getting the last bit into his mouth, that he was forced to let it go again.

To these notions the celebrated Milton alludes, in the first book of the Paradise Lost:

> ——— As when the Sun new risen
> Looks through the horizontal misty air,
> Shorn of his beams, or from behind the Moon
> In dim eclipse disastrous twilight sheds
> On half the nations, and with fear of change
> Perplexes monarchs.

The opinions of the Chinese with regard to eclipses

are very similar to those of the Hindoos, and had, probably, the same origin. A knowledge of the nature of eclipses, and of the superstitious notions entertained of them, was of considerable advantage to Christopher Columbus, when, in 1493, he was driven on the island of Jamaica, and, distressed for want of provisions, was refused relief; but having threatened them with a plague, and foretelling an eclipse, as a token of it, which happened according to his prediction, the barbarians were so terrified, that they strove who should be the first in bringing supplies, throwing them at his feet, and imploring forgiveness.

Solar eclipses happen only when the Moon is in conjunction with the Sun, that is at the new Moon, and also in the nodes, or near them, the limit being about 17° on each side a node; such eclipses only happening, as we have shown, when the latitude of the Moon, viewed from the Earth, is less than the sum of the apparent semidiameters of the Sun and Moon. In the nodes, when the Moon has no visible latitude, the occultation is total; with some continuance when the disk of the Moon in perigee appears greater than that of the Sun in apogee, and its shadow is extended beyond the surface of the Earth; and total, without continuance, when the point of the Moon's shadow barely covers the Earth. Lastly, out of the nodes, but within the limits, the eclipses are partial.

Other circumstances of solar eclipses are the following:—1. An eclipse of the Sun does not appear the same in all parts of the Earth where it is seen, but is in some total or annular, while in others it is partial. 2. A solar eclipse does not happen at the same time in all places where it is seen; but appears more early to the western parts, and more late to the eastern; as the motion of the Moon beyond the Sun, and consequently of her shadow, is from west

to east. 3. An eclipse of the Sun begins on the western side, and ends on the eastern. 4. No eclipse of the Sun happens to all places where the Sun is visible; for the penumbra does at no time cover a hemisphere of the Earth. 5. The position of the cusps of the horns of the unobscured part of the Sun's disk may be easily found in the middle of the eclipse; for the line which joins them is parallel to the Moon's apparent way. 6. The middle of a solar eclipse will not be at the same time in all places on the same meridian; for the parallax of longitude will be different in different latitudes. 7. The excess of the apparent semidiameter of the Moon above that of the Sun, in a total eclipse, is so small, that total darkness seldom continues more than four minutes in the latitude of London. 8. In most solar eclipses the Moon's disk is covered with a faint light, which is attributed to the reflection of the light from the illuminated part of the Earth. 9. In total eclipses of the Sun, the darkness is sometimes so great as to render visible the planets above the horizon, and stars of the second magnitude; of such an eclipse we shall shortly give a full description. In such eclipses the Moon's limb is seen surrounded with a ring which appears much brighter and whiter near the Moon's body than at a distance from it; this ring, in all respects, resembles the appearance of an enlightened atmosphere viewed from a distance; but whether it belongs to the Moon or the Sun is not entirely decided, though it is generally supposed that it belongs to the former.

The limits of a solar eclipse would be determined after the same manner as those of a lunar one, if the Moon's parallax were insensible; but because the parallax is considerable, the method is rather altered. 1. Add together the apparent semidiameters of the luminaries, both in apogee and perigee; this gives 33′ 16″ for the greatest sum, and 30′ 31″ for the least. 2. Since the parallax diminishes the

northern latitude, and augments the southern, let the greatest parallax in latitude be added to the former sums, and also subtracted from them; the sum, or difference, will in each case give the latitude beyond which there can be no eclipse; this latitude being given, the distance from the node is readily determined, and is found to be from 16½° to 18½°, according to circumstances, for the limit, beyond which there can be no solar eclipse. Or, for this purpose, M. Cassini gives the following directions: 'Find the time of the mean conjunction, and at that time find the Sun's mean longitude, also the longitude of the Moon's node; and if the difference of these be less than 21°, there may be an eclipse; but if the difference be less than 15°, there must be one.'

Hereafter, in a succeeding volume, we shall show in what manner eclipses of the Sun and Moon are calculated with undeviating accuracy.

Table of the Sun's Rising and Setting every 10th Day:

Saturday	1st, Sun rises 3 h. 45 m.	Sun sets 8 h.	15 m.
Tuesday	11th, - - - - - - 3 h. 52 m. - - - - -	8 h.	8 m.
Friday	21st, - - - - - - 4 h. 3 m. - - - - -	7 h.	57 m.
Monday	31st, - - - - - - 4 h. 17 m. - - - - -	7 h.	43 m.

Table of Equation of Time for every fifth Day.—[See January.]

			m.	s.
Saturday	1,	to the time shown on the dial *add*	3	13
Thursday	6,	- - - - -	4	9
Tuesday	11,	- - - - -	4	56
Sunday,	16,	- - - - -	5	33
Friday,	21,	- - - - -	5	56
Wednesday	26,	- - - - -	6	6
Monday	31,	- - - - -	6	1

The Sun enters the sign Leo on the 23d, at 49 m. past seven in the afternoon.

There is an eclipse of the Sun on the 6th, but invisible here. It will be centrally eclipsed on the

meridian at 38 m. past 11 o'clock, in longitude 174° 24′ west, and north latitude 38° 3′.

New Moon or change will take place at 47 m. past 11 at night, on the 6th. She enters her first quarter 12 m. past two in the afternoon of the 13th, is full on the 21st, at 33 m. past eight, and enters the last quarter on the 29th, at 2 m. past 11 o'clock in the forenoon.

The Moon passes the meridian on the

18th day, at	4 m. past	10 in the evening.
19th - - - -	54 - - - -	10 - - - - - - -
20th - - - -	44 - - - -	11 - - - - - - -
21st - - - -	33 - - - -	12 - - - - - - -

The eclipses of Jupiter's first satellite are not visible in London this month.

Mercury's inferior conjunction happens on the 22d, at 2 o'clock in the afternoon.

HISTORY OF ASTRONOMY.

[Continued from p. 118.]

When Charles II erected the observatory at Greenwich, Mr. Flamstead was appointed astronomer-royal. This was in the year 1676. He was the first who explained the true principles of the equation of time, and, during the long space of thirty-three years, he made an immense number of observations on the planets, comets, and fixed stars, likewise on the solar spots, and the satellites of Jupiter. These observations are recorded in a work that was published in 1723, after his death, intitled, *Historia Celestis*. The first volume contains all the observations which he made at Derby and Greenwich on the fixed stars, planets, comets, spots in the Sun, and satellites of Jupiter. The second comprehends the transits of the planets and fixed stars over the meridian, and the places of the planets which he deduced from

them. The third volume contains a description of the instruments used by Tycho Brahe and himself: the catalogues of the fixed stars made by Ptolemy, Ulugh-Beigh, Tycho, the Prince of Hesse, and Hevelius, and also the British catalogue of nearly three thousand stars, with their longitudes and latitudes, and their right ascensions and declinations. Dr. Halley's tables, and Sir Isaac Newton's theory of the Moon, were founded on the observations contained in that valuable work. Another work of this author, entitled *Atlas Celestis*, was published in 1753.

The newly discovered theory of universal gravitation effected a complete revolution in physical astronomy. The discoveries of Galileo, Huygens, and Kepler, and the speculations of Dr. Hooke on gravity, were the first steps in the investigation of this general principle, and the comprehensive mind of Newton was only wanting to combine and generalize them.

Before we come immediately to these, it may not be amiss to take a little more notice of Dr. Hooke, who, in addition to his other excellent qualifications, had very accurate general notions of the nature of the mutual attraction of the celestial bodies; for, at a meeting of the Royal Society in the year 1666, he expressed himself as follows:—'I will explain a system of the world very different from any yet received, and it is founded on the three following positions. 1. That all the heavenly bodies have not only a gravitation of their parts towards their own proper centre, but that they mutually attract each other within their spheres of action. 2. That all bodies having a simple motion, will continue to move in a straight line, unless continually deflected from it by some extraneous force, causing them to describe a circle, an ellipse, or some other curve. 3. That this attraction is so much the greater as the bodies are nearer. As to the proportion in which those forces diminish by an increase of distance, I own,'

said he, 'I have not discovered it, although I have made some experiments to this purpose: I leave this to others, who have time and knowledge sufficient for the task.' Previous to this period, Dr. Hooke had exhibited to the Society an experiment, with a view to show how a motion in a curve might be produced, in consequence of a tendency in a body towards a centre. A ball suspended by a thread from the ceiling was made to revolve about another ball laid on a table immediately below the point of suspension. When the push given to the pendulous ball was properly adjusted to its deviation from the perpendicular, it described a perfect circle round the ball on the table; but when the push was very great, or very small, it described an ellipse, having the other ball in its centre. Dr. Hooke showed that this was the operation of a deflecting force directly proportional to the distance from the other ball; but he added, that although this illustrated the planetary motions, in some degree, yet it was not suitable to their cause; for the planets describe ellipses, having the Sun not in the centre, but in one of their foci; therefore they are not retained by a force proportional to their distance from the Sun. In these remarks, we have a clear and modest account of a rational theory; and it must be inferred from them, that Dr. Hooke had anticipated Newton in describing the general nature of the planetary motions, although it is solely to the latter that we owe the discovery of the precise law of the force by which the very motions we observe are produced.

To this extent the true theory of the motions of the heavenly bodies had been discovered, or rather conjectured, when Sir Isaac Newton turned his attention to the subject. He was then only twenty-four years of age; but before this period, he had, by his discoveries concerning light and colours, evinced a strength of mind, a felicity of invention, and a patience in investigation, which have very sel-

dom been found united in any man whose name is on record, and, perhaps, have never been exceeded: indeed the whole of his character was such as placed him in the highest rank of illustrious men, and made him at once an ornament to the age in which he lived, and to human nature. The circumstances under which he discovered the true theory of the planetary motions, are stated by Dr. Pemberton, in his preface to his View of Sir Isaac Newton's Philosophy. They are in substance as follow: He had retired from Cambridge to his country-house, in the year 1666, on account of the plague; and one day as he sat alone, in his garden, reflecting on the power by which all terrestrial bodies gravitate towards the Earth, it occurred to him, that, as this power is not sensibly diminished at any distance to which we can recede from the Earth's centre, there seemed reason to conclude that it extended much farther than was commonly supposed, and even might extend as far as the Moon; and if this were true, he concluded that her motion would be influenced by it, and that probably it was this very force which retained her in her orbit. However, although the force of gravity be not sensibly less at the tops of the highest mountains than at the ordinary level of the Earth's surface, he conceived it to be very possible, that, at so great a distance as that of the Moon, it might be considerably different. To make an estimate of what might be the degree of the diminution, he considered that, if the Moon be retained in her orbit by the force of gravity, no doubt the primary planets are carried round the Sun by a like power; and by comparing the periods of the several planets with their distances from the Sun, he found, that if any power like gravity kept them in their orbits, its strength must decrease in proportion as the squares of the distances increase: but, in making this conclusion, he supposed that the orbits of the planets were circles, having the Sun in their centre, from

which figure the greater part of them do not much differ.

Supposing, therefore, the force of gravity to extend as far as the Moon, and to decrease according to this ratio, he computed whether that force would be sufficient to keep the Moon in her orbit; but having no book at hand by which he might ascertain the true magnitude of the Earth, he was obliged to employ in his calculation the erroneous estimate, at that time commonly received among geographers and seamen, namely, that a degree of latitude on the Earth's surface was 60 English miles. Now, as a degree contains, in reality, about 69½ miles, his computation, of course, did not agree with the phenomena; and on this account he laid aside, at that time, all further consideration of the subject.

Some years after, in consequence of a letter he received from Dr. Hooke, he investigated the nature of the path which a body would describe, if it were let fall from any high place, taking into account the rotation of the Earth; and, on this occasion, he resumed his former train of reflections concerning the motion of the Moon. He had now, however, the advantage of knowing pretty nearly the exact magnitude of the Earth, in consequence of the measurement of an arch of the meridian, made in France by Picard; and he had the inexpressible satisfaction of finding that his calculation agreed exactly with what it ought to be, if the opinion he had formed was correct. He therefore concluded that his conjecture was correct, and that the Moon was really kept in her orbit by the force of gravity, which decreased according as the square of the distance increased, agreeably to what he had supposed.

It is said, that, as the calculation drew to a close, the mind of Newton was so much agitated by the importance of the discovery he was on the point of making, that he was obliged to desire a friend to finish them. This is not to be wondered at, when

we consider the great revolution which he foresaw he was about to produce in the opinions of mankind, and the immense fabric of science that might be built on his discovery. Soon afterwards he composed twelve propositions, comprehending the rudiments of a mathematical theory of the celestial motions; and these again, in process of time, were followed by his *Principia*, a work of transcendent excellence, and written upon the most abstruse of all subjects, and yet composed in the short period of about eighteen months.—[*See Edinburgh Encyclopædia.*]

[To be continued.]

The Naturalist's Diary.

Hark! where the sweeping scythe now rips along;
Each sturdy mower emulous and strong,
Whose writhing form meridian heat defies,
Bends o'er his work, and ev'ry sinew tries,
Prostrates the waving treasure at his feet.

This month is, generally, accounted the hottest in the year. In consequence of the excessive heat, an evaporation takes place from the surface of the earth and waters, and large clouds are formed, which pour down their watery stores, and deluge the country with floods; frequently laying the full-grown corn. These summer storms are generally attended by thunder and lightning. During the intense heat of this month, we eagerly seek the luxury of cooling shades. Bathing, too, is both agreeable and healthful at this time.

Animals are oppressed with universal languor, and either bend their way to pools of water, the coverts of the forest, or to any place that will shade them from the almost vertical sun.

The flowers which blossomed in the last month soon mature their seeds, and hasten to decay. A new race succeeds, which demands all the fervid rays of a solstitial sun to bring it to perfection.

At the beginning of the month, the beech (*fagus sylvatica*), the wild carrot (*daucus carrota*), the calathian violet (*gentiana pneumonanthe*), betony, nightshade (*circæa lutetiana*), lavender (*lavendula spica*), and the wild angelica (*angelica sylvestris*), have their flowers full blown; and the flowers of the white lily (*lilium candidum*) begin to open: the thistle, sowthistle, hawkweed, blue bottle (*centaurea cyanus*), marygold, golden-rod, camomile, and sunflower; the whole race of sedums and cotyledons; and the aquatic and marsh plants, as bulrush, water-lily, &c. flourish this month.

The different tribes of insects, which, for the most part, are hatched in the spring, are now in full vigour; but the plenitude of their enjoyment is limited indeed, for they die at the approach of winter.

The first state in which insects appear, is that of the *ovum*, or egg; from the egg is hatched the insect in its larve or caterpillar state. The larva, or maggot, crawls on many feet, and is extremely voracious, devouring the herbage, and stripping trees of their leaves. When the time arrives in which the larva or caterpillar is to change into the next state, viz. that of chrysalis, or *pupa*, it ceases to feed; and having placed itself in some quiet situation for the purpose, lies still for several hours; and then, by a kind of laborious effort, frequently repeated, divests itself of its external skin, or larva coat, and immediately appears in the very different form of a chrysalis or pupa. From this state emerges, at length, the insect, in its complete or ultimate form, from which it can never change; nor can it receive any further increase of growth. This last state is denominated *imago*.

> Waked by his warmer ray, the reptile young
> Come winged abroad; by the light air upborne,
> Lighter, and full of soul. From every chink,
> And secret corner, where they slept away
> The wintery storms; or rising from their tombs,
> To higher life; by myriads, forth at once,
> Swarming they pour; of all the varied hues
> Their beauty-beaming parent can disclose.
> Ten thousand forms! ten thousand different tribes!
> People the blaze. To sunny waters some

By fatal instinct fly; where on the pool
They, sportive, wheel; or, sailing down the stream,
Are snatched immediate by the quick-eyed trout,
Or darting salmon. Through the greenwood glade
Some love to stray; there lodged, amused, and fed,
In the fresh leaf. Luxurious, others make
The meads their choice, and visit every flower,
And every latent herb; for the sweet task,
To propagate their kinds, and where to wrap,
In what soft beds, their young yet undisclosed,
Employs their tender care. Some to the house,
The fold, and dairy, hungry, bend their flight;
Sip round the pail, or taste the curdling cheese:
Oft, inadvertent, from the milky stream
They meet their fate; or, weltering in the bowl,
With powerless wings around them wrapt, expire.

Towards the middle of the month, the potato (*solanum tuberosum*), the spiked willow (*spiræa salicifolia*), jessamine (*jasminum officinale*), hyssop (*hyssopus officinalis*), the bell-flower (*campanula*), and the white lily, have their flowers full blown.

Thomas Warton has prettily described some of the delights of summer at this time, particularly the appearances of nature after a shower, such as usually happens at this season:

But ever, after summer show'r,
When the bright sun's returning pow'r
With laughing beam has chased the storm,
And cheered reviving nature's form;
By sweet-briar hedges, bathed in dew,
Let me my wholesome path pursue,
There issuing forth the frequent snail,
Wears the dank way with slimy trail,
While as I walk, from pearled bush,
The sunny-sparkling drop I brush,
And all the landscape fair I view
Clad in a robe of fresher hue;
From shelter deep of shaggy rock
The shepherd drives his joyful flock;
From bowering beech the mower blithe
With new-born vigour grasps the scythe;
While o'er the smooth unbounded meads
His last faint gleam the rainbow spreads.

As a sequel to this picture we may add some no less pleasing lines from another poet:

Have ye not seen in gentle even-tide,
When Jupiter the earth hath richly showered,
Striding the clouds, a bow dispredden[1] wide
As if with light inwove, and gaily flowered
With bright variety of blending dies?
White, purple, yellow, meet along the skies,
Alternate colours sink, alternate colours rise.

Pomona now begins to offer her fruits, to allay the parching thirst; currants, gooseberries, raspberries, strawberries, cherries, and cranberries, are all peculiarly refreshing at this season.

Towards the end of the month, the flowers of the laurustinus (*viburnum tinus*), and the burdock (*arctium lappa*), begin to open; and the elecampane (*inula helenium*), the amaranth (*amaranthus caudatus*), the great water plantain (*alisma plantago*), water mint (*mentha aquatica*), and the common nightshade, have their flowers full blown.

Young frogs leave their ponds, and resort to the tall grass for shelter; swallows and martins congregate previously to their departure; young partridges are found among the corn; and poultry moult. The hoary beetle (*scarabæus soletitialis*) makes its appearance; bees begin to expel and kill drones; and the flying ants quit their nests.

The maritime plants which flower in July, are the club rush (*scirpus maritimus*), bearded cat's tail grass (*phleum crinitum*), bulbous fox tail grass (*alopecurus bulbosus*), the reflexed and creeping meadow grass (*poa distans* and *maritima*), the field eryngo (*eryngium campestre*), parsley water drop-wort (*œnanthe pimpinelloides*), smooth sea-heath (*frankenia lævis*), and the golden dock (*rumex maritimus*); all of which are to be found in salt marshes.

On *sandy shores* may be seen the sea-mat weed (*arundo arenaria*), upright sea-lime grass (*elymus arenarius*), the sea lungwort (*pulmonaria maritima*),

[1] Spread.

the sea bind-weed (*convolvulus soldanella*), saltwort (*salsola*), sea-holly (*eryngium maritimum*): prickly samphire (*echinophora spinosa*), and the sea-lavender (*statice limonium*), are found on maritime rocks; and the sea pea (*pisum maritimum*) on rocky shores.

About the middle of this month, pilchards (*clupea pilchardus*) appear, in vast shoals, off the Cornish coast.

The farmer's labours, in this month, are various and important. In the southern parts of the island, the corn harvest commences; but August is, generally, dedicated to this grateful employment; though, in some districts, the work of the sickle is protracted till September or even October. The hay-harvest in the north is generally completed in July. Flax and hemp are pulled in this month.

AUGUST.

SEXTILIS was the antient Roman name of this month, being the sixth from March. The Emperor Augustus changed this name, and gave it his own, because in this month Cæsar Augustus took possession of his first consulship; celebrated three triumphs; reduced Egypt under the power of the Roman people; and put an end to all civil wars. 'The Saxons called August *arn-monat* (more rightly *barn-monat*), intending thereby the then filling of their barnes with corne.'

Remarkable Days.

1.—LAMMAS DAY.

THIS day, in the Romish Church, is generally called *St. Peter in the Fetters*, in commemoration of this apostle's imprisonment. It is probably derived from an old Saxon term, signifying *Loaf-Mass*; as

it was customary for the Saxons to offer an oblation of loaves, made of new wheat, on this day, as the first-fruits of their new corn.

6.—TRANSFIGURATION.

Though this day was observed in remembrance of our Lord's *Transfiguration* on the Mount, by the primitive Christians, yet it is but of recent date in the Church of Rome; as it was not instituted by Pope Calixtus until the year 1455.

7.—NAME OF JESUS.

Before the Reformation, this day was dedicated to *Afra*, a woman who had been converted to Christianity by Narcissus, Bishop of Jerusalem, and who afterwards suffered martyrdom; and the breviary was recognised by Paul V. Afterwards Donatus, who became martyr in the time of Julian, for refusing to sacrifice, was substituted in her place. Our reformers devoted it to the NAME OF OUR BLESSED LORD.

On this day the *Jews* commemorate the death of Aaron the High Priest.

10.—SAINT LAWRENCE.

St. Lawrence was, by birth, a Spaniard, and treasurer of the Church of Rome, being deacon to Pope Sextus, about the year 259. Soon afterwards, his bishop was killed by the soldiers of Valerian the emperor, with whom our saint would willingly have died. Lawrence refusing to deliver up the church-treasure, which they imagined to be in his custody, he was laid upon a gridiron, and broiled over a fire: this torture he bore with such incredible patience and cheerfulness, that he told his tormentors to turn him round, as he was done enough on one side. His martyrdom was so highly esteemed, that Pulcheria, the empress, erected a temple to his honour, which was afterwards either rebuilt or greatly enlarged by Justinian. In this temple, the gridiron on which he died was deposited with great pomp and solemnity; and, if we may believe St. Gregory, it became famous for abundance of miracles. The

celebrated palace of the Escurial is dedicated to this saint.

12.—PRINCE OF WALES BORN.

George, Prince of Wales, was born on the 12th of August, 1762; and married on the 8th of April, 1795, to the Princess Caroline of Brunswick, who was born on the 17th of May, 1768. He has one daughter, Charlotte Augusta, born Jan. 7, 1796. His Royal Highness was appointed REGENT on the 6th of February, 1811.

15.—ASSUMPTION.

This is a festival in the Greek and Romish Churches, in honour of the supposed miraculous ascension of the Virgin Mary into heaven.—On this day the *Jews* observe what is called the *Black Fast*, or anniversary of the destruction of the first and second Temples. They also commemorate the taking of Bethuliah, mentioned in the Maccabees; the sedition of Ben Cosebah under the Emperor Adrian; and the outrage of Turnus Rufus the Roman general, who ploughed up the ground on which the Temple had stood.

24.—SAINT BARTHOLOMEW.

The word Bartholomew means the son of Tolmai, or Tolomæus, the name of a family among the Jews, mentioned by Josephus. He preached the Gospel in Armenia, converted the Lycaonians, and afterwards visited India. Some authors assert, that he was crucified, like St. Peter, with his head downwards; others, however, with more probability, say, that he was flayed alive, by order of Astyages, King of Armenia.

In the year 1662, on this day, two thousand ministers were ejected from their livings, because they would not comply with the Act of Uniformity. The anniversary of Bartholomew is also memorable for the cruel massacre of the Protestants in France, begun on this day in the reign of Charles IX. Some calculate the number of miserable sufferers at *seventy*, others at *a hundred thousand!*

The 24th of August is observed by the *Jews* as a day of humiliation, because the western light of the Temple was miraculously extinguished during the reign of Ahaz.

28.—SAINT AUGUSTINE.

Augustine was born at Thagaste, a town in Numidia, in the year 354. He early applied himself to the study of polite literature, and became a professor of philosophy and rhetoric, first at Rome, and afterwards at Milan. He next diligently studied theology, in which he was instructed by St. Ambrose, with whom he contracted an intimate acquaintance. In the year 388, he returned to his native country, and, three years afterwards, was chosen Bishop of Hippo. Augustine was a judicious divine, and the most voluminous writer of all the Fathers. He died in 430, at the age of seventy-seven.

29.—JOHN BAPTIST BEHEADED.

This day was formerly denominated *Festum Collectionis Sancti Johannis Baptistæ*, or the feast of gathering up St. John the Baptist's relics; but afterwards, by corruption, *Festum Decollationis*, the festival in remembrance of his being beheaded. His nativity is celebrated on the 24th of June, which see.

Astronomical Occurrences.

Eclipses.

[Continued from p. 227.]

As total solar eclipses are by no means common, we shall give an interesting description of one, by Dr. Stukeley, sent to his friend, the celebrated Dr. Edmund Halley.

'According to my promise, I send you what I observed of the solar eclipse, though I fear it will not be of any great use to you. I was not prepared with any instruments for measuring time or the like, and proposed to myself only to watch all the appearances that nature would present to the naked eye

upon so remarkable an occasion, and which generally are overlooked, or but grossly regarded. I chose, for my station, a place called Haradon Hill, two miles eastward from Amsbury, and full east from the opening of Stonehenge avenue, to which it is as the point of view. Before me lay the vast plain where that celebrated work stands, and I knew that the eclipse would appear directly over it; beside, I had the advantage of a very extensive prospect every way, this being the highest hill hereabouts, and nearest the middle of the shadow. Full west of me, and beyond Stonehenge, is a pretty copped hill, like the top of a cone, lifting itself above the horizon; this is Clay Hill, near Warminster, twenty miles distant, and near the central line of darkness, which must come from thence, so that I could have notice enough before-hand of its approach. Abraham Sturgis and Stephen Ewens, both of this place, and sensible men, were with me. Though it was very cloudy, yet now and then we had gleams of sunshine, rather more than I could perceive at any other place around us: These two persons, looking through smoked glasses, while I was taking some bearings of the country with a circumferentor, both confidently affirmed that the eclipse was begun, when, by my watch, I found it just half an hour after five; and accordingly from thence the progress of it was visible, and, very often, to the naked eye; the thin clouds doing the office of glasses. From the time of the Sun's body being half covered, there was a very conspicuous circular iris round the Sun, with perfect colours. On all sides we beheld the shepherds hurrying their flocks into fold, the darkness coming on; for they expected nothing less than a total eclipse for an hour and a quarter.

'When the Sun looked very sharp, like a new Moon, the sky was pretty clear in that spot; but, soon after, a thick cloud covered it, at which time

the iris vanished, the copped hill before mentioned grew very dark, together with the horizon, on both sides, that is, to the north and south, and looked blue, just as it appears in the east at the declension of day. We had scarce time to tell ten, when Salisbury steeple, six miles off southward, became very black; the copped hill quite lost, and a most gloomy night with full career came upon us. At this instant we lost sight of the Sun, whose place among the clouds was hitherto sufficiently distinguishable, but now not the least trace of it to be found, no more than if really absent: then I saw, by my watch, though with difficulty, and only by help of some light from the northern quarter, that it was six hours thirty-five minutes; just before this the whole compass of the heavens and earth looked of a lurid complexion, properly speaking, for it was black and blue, only on the earth upon the horizon the blue prevailed; there was likewise in the heavens, among the clouds, much green interspersed, so that the whole appearance was really very dreadful, and as symptoms of sickening nature.

'Now I perceived us involved in total darkness and palpable, as I may aptly call it, though it came quick, yet I was so intent that I could perceive its steps, and feel it, as it were, drop upon us, and fall on the right shoulder (we looking westward) like a great dark mantle, or coverlet of a bed, thrown over us, or like the drawing of a curtain on that side; and the horses we held in our hands were very sensible of it, and crowded close to us, startling with great surprise. As much as I could see of the men's faces that stood by me had a horrible aspect. At this instant I looked around me, not without exclamations of admiration, and could discern colours in the heavens, but the earth had lost its blue, and was wholly black. For some time among the clouds there were visible streaks of rays, tending to the place of the Sun as their centre; but, immediately after, the

whole appearance of earth and sky was entirely black. Of all things I ever saw in my life, or can by imagination fancy, it was a sight the most tremendous.

'Toward the north-west, whence the eclipse came, I could not, in the least, find any distinction in the horizon between heaven and earth, for a good breadth, of about 60 degrees, or more; nor the town of Amesbury underneath us, nor scarce the ground we trod on. I turned myself round several times during this total darkness, and remarked, at a good distance from the west on both sides, that is, to the north and south, the horizon very perfect; the earth being black, the lower part of the heavens light; for the darkness above hung over us like a canopy, almost reaching the horizon in those parts, or as if made with skirts of a lighter colour; so that the upper edges of all the hills were as a black line, and I knew them very distinctly by their shape or profile; and, northward, I saw perfectly, that the interval of light and darkness in the horizon was between Marlbrook Hill and St. Ann's Hill; but, southward, it was more indefinite. I do not mean that the verge of the shadow passed between those hills, which were but twelve miles distant from us, but so far I could distinguish the horizon, beyond it not at all; the reason of it is this:—the elevation of ground I was upon gave me an opportunity of seeing the light of the heavens beyond the shadow; nevertheless, this verge of light looked of a dead, yellowish, and greenish colour; it was broader to the north than south, but the southern was of a tawny colour. At this time, behind us, or eastward, toward London, it was dark too, where, otherwise, I could see the hills beyond Andover, for the foremost end of the shadow was past thither; so that the whole horizon was now divided into four parts of unequal bulk, and degrees of light and dark; and part to the north-west broadest and blackest, to the south-west lightest

and longest. All the change I could perceive during the totality was, that the horizon, by degrees, drew into two parts, light and dark; the northern hemisphere growing still longer, lighter, and broader; and the two opposite dark parts uniting into one, and swallowing up the southern enlightened part.

'As, at the beginning, the shade came feelingly upon our right shoulders, so now the light from the north, where it opened as it were, though I could discern no defined light or shade upon the earth that way, which I earnestly watched for, yet it was manifestly by degrees, and with oscillations, going back a little, and quickly advancing further, till, at length, upon the first lucid point appearing in the heavens, where the Sun was, I could distinguish pretty plainly a rim of light running alongside of us a good while together, or sweeping by at our elbows from west to east: just then, having good reason to suppose the totality ended with us, I looked on my watch, and found it to be full three minutes and a half more. Now the hill tops changed their black into blue again, and I could distinguish a horizon where the centre of darkness was before: the men cried out they saw the copped hill again, which they had eagerly looked for; but still it continued dark to the south-east, yet I cannot say that ever the horizon that way was undistinguishable. Immediately, we heard the larks chirping and singing very briskly, for joy of the restored luminary, after all things had been hushed into a most profound and universal silence. The heavens and earth now appeared exactly like morning before Sun-rise, of a greyish cast, but rather more blue interspersed; and the earth, so far as the verge of the hill reached, was of a dark green or russet colour.

'As soon as the Sun emerged, the clouds grew thicker, and the light was very little amended for a minute or more, like a cloudy morning slowly ad-

vanishing. After about the middle of the totality, and soon after the emersion of the Sun, we saw Venus very plainly, but no other star. Salisbury steeple now appeared. The clouds never removed, so that we could take no account of it afterward; but, in the evening, it lightened very much. I hasted home to write this letter, and the impression was so vivid upon my mind, that I am sure I could, for some days after, have wrote the same account of it, and very precisely. After supper I made a drawing of it from my imagination, upon the same paper I had taken a prospect of the country before.

'I must confess to you, that I was (I believe) the only person in England that regretted not the cloudiness of the day, which added so much to the solemnity of the sight, and which incomparably exceeded, in my apprehension, that of 1715, which I saw very perfectly from the top of Boston steeple, in Lincolnshire, where the air was very clear; but the night of this was more complete and dreadful: there, indeed, I saw both sides of the shadow come from a great distance, and pass beyond us to a great distance; but this eclipse had much more of variety and majestic terror; so that I cannot but felicitate myself upon the opportunity of seeing these two rare accidents of nature in so different a manner; yet I should willingly have lost this pleasure for your more valuable advantage of perfecting the noble theory of the celestial bodies, which, last time, you gave the world so nice a calculation of; and wish the sky had now as much favoured us for an addition to your honour and great skill, which I doubt not to be as exact in this as before.'

Table of the Sun's Rising and Setting every 10th Day:

			h. m.		h. m.
Tuesday	1st,	Sun rises	4 18	Sun sets	7 42
Friday	11th,	- - - - -	4 35	- - - -	7 25
Monday	21st,	- - - - -	4 52	- - - -	7 7
Thursday	31st,	- - - - -	5 11	- - - -	6 49

Table of the Equation of Time, for every 5th Day. [See January.]

			m. s.
Tuesday	1st,	*to* the time shown on the dial *add*	5 59
Sunday,	6th,	- - - - -	5 37
Friday,	11th,	- - - - -	5 0
Wednesday	16th,	- - - - -	4 8
Monday	21st,	- - - - -	3 3
Saturday	26th,	- - - - -	1 46
Thursday	31st,	- - - - -	0 20

The Sun enters the sign Virgo on the 24th, at 15 m. past 2 in the morning. The Moon and planet Mars are in conjunction at 56 m. past 3 in the morning of the 25th.

The Herschel planet will appear stationary on the 11th.

The new Moon will occur on the 5th, at 57 m. past 6 o'clock in the morning. She enters her first quarter on the 11th, at 13 m. past 11 at night; is full on the 19th, at 11 m. past midnight, and enters her last quarter at 22 m. past 10 on the 27th.

The Moon may be seen on the meridian on the

16th, at 43 m. past 9 in the evening.
17th - - 32 - - - - 10 - - - evening.
18th - - 20 - - - - 11 - - - evening.
19th - - - 5 - - - - 12 - - - evening.

There are no eclipses of Jupiter's first satellite visible this month.

Mercury's greatest elongation is on the 10th, and that of Venus is on the 1st. Saturn is in opposition at 6 o'clock on the morning of the 2d. The Herschel is in its quadrature on the 27th, at 4 in the morning.

HISTORY OF ASTRONOMY.

[Continued from p. 233.]

Of the great discoveries of Sir Isaac Newton we gave an account in pp. 230-233. It must, however, be observed, that previously to the exertions of our great English philosopher, a foundation for the true

theory had been prepared by the sagacity and industry of Kepler, who had ascertained certain important facts respecting the orbits of the planets. These he had with vast labour and ingenuity deduced from the observations of Tycho Brahè. They are three in number, are commonly known by the name of Kepler's Laws, and are expressed in the form of propositions, as follow:

I. All the planets move round the Sun in such a manner, that a line supposed to be drawn from the planet to the Sun, which is called the *radius vector*, describes, or passes over, equal areas in equal times.

II. Each planet, in its annual journey, describes an ellipse, having the Sun in one of its foci.

III. The squares of the periodic times of the planets have the same proportion to one another, as the cubes of their mean distances from the Sun.

These laws were originally framed from a most laborious and careful examination of the actual motions of the primary planets known in the days of Kepler: they have, however, been found to apply equally to the orbits of the planets discovered since that period, as well as to those of the satellites of all the planets, and of nearly one hundred comets which have been accurately observed.

Among the contemporaries of Sir Isaac Newton, were several astronomers, who have full claim upon the remembrance of posterity. James Philip Maraldi, who was born at Nice in 1665, was employed under Cassini, in constructing the great meridian through France, and left behind him a valuable catalogue of fixed stars; he likewise determined the retrograde motion of Jupiter's nodes: he discovered the variation in the inclination of the orbits of Jupiter's satellites, and corrected the theory of Mars.

Mr. Pound ascertained that the equatorial was to the polar diameter of Jupiter as 13 to 12: he calculated new tables for computing the eclipses of

Jupiter's first satellite, and he rectified the motions of the satellites of Saturn.

The celebrated Dr. Halley, who was one of Newton's most eminent contemporaries, conferred many important obligations on the science of astronomy. When he was only eighteen years of age, he published a geometrical method of finding the aphelia and excentricity of the planetary orbits, and in the following year he went to St. Helena, to make a catalogue of the fixed stars in the southern hemisphere. During his abode in St. Helena, he observed a transit of Mercury, and, in the course of the observation, it occurred to him that the Sun's parallax might be ascertained by the transit of Venus over his disk, and he pointed out the method by means of which this important problem was to be investigated.

The sight of the famous comet in 1680, which he obtained in his road from Calais to Paris, gave occasion to his theory respecting the orbits of these wandering bodies, by which he was enabled to predict the return of the comet in 1759. In the year 1691, he published tables of the conjunctions of Mercury and Venus with the Sun, and he afterwards directed his chief attention to the lunar theory. Upon the death of Flamsteed, in 1719, Dr. Halley succeeded to the office of astronomer-royal, and in the same year he published his tables of the Sun, Moon, and planets. Though he was now in the 64th year of his age, this indefatigable astronomer continued to observe the Moon's transit for eighteen years longer, and made many hundred observations which enabled him to correct his theory of the Moon. Upon the death of Dr. Halley, in 1742, he was succeeded by Mr. Bradley in the royal observatory, to whom we are indebted for two of the most beautiful discoveries of which science has to boast. While endeavouring to determine the parallax of the fixed stars, he discovered the supposed aberration of these bodies,

which arises from the motion of light combined with the motion of the Earth in its orbit. In the year 1745, he was led, by observation, to the discovery of the mutation of the Earth's axis, a phenomenon which he ascribed to the action of the Moon upon the protuberant equatorial parts of the terrestrial spheroid. Dr. Bradley constructed, from his own observations, new tables of Jupiter's satellites. He fixed, with a wonderful degree of precision, both the quantity and the laws of atmospherical refractions, and gave a method of computing the corrections which are necessary from a variation in the temperature and pressure of the atmosphere.

It was about this period, that France produced a number of excellent astronomers, distinguished chiefly by the variety and importance of their observations. In 1751, M. de la Caille undertook a voyage to the Cape of Good Hope, for the purpose of perfecting the catalogue of stars in the southern hemisphere, which had been begun by Dr. Halley. After the most strenuous exertions, he returned to Europe with a catalogue of nearly 10,000 stars, comprehended between the southern pole and the tropic of Capricorn. The places of 1942 stars were calculated, from his observations, and published in 1763 in his *Cœlum Australe Stelliferum*. In addition to these labours, La Caille computed new tables of the Sun, containing equations for the attraction of Jupiter and Venus: he made observations on the parallax of Mars and Venus, on atmospherical refraction, and on the length of pendulums; and, during his stay at the Cape of Good Hope, he measured a degree of the meridian.

John James Cassini, Bouguer, Condamine, and Maupertuis, were contemporaries with La Caille. Of these, the first published a treatise on astronomy, with tables founded on the observations of his father. Bouguer wrote a valuable work on the figure of the Earth, and, in conjunction with Condamine, he

went to South America, to measure a degree of the meridian in Peru; and these were the first philosophers who ascertained, by actual experiment, the attraction of mountains by determining the deflection of the plumb-line produced by the attraction of Chimborazo. Maupertuis was at the head of the French astronomers who undertook a journey to Lapland to measure, in that northerly region, a degree of the meridian.

Omitting those improvements which astronomy has received, since the days of Newton, by the higher analysis, we may observe that the celebrated Tobias Mayer, of Gottingen, who had directed his whole attention to the improvement of the solar and lunar tables, computed a new set founded on *solutions* given by Euler, and carefully corrected by a number of his own accurate observations. These tables gave the longitude of the Moon within thirty seconds. Mayer continued to render these tables more perfect till his death, when he left behind him a complete set of solar and lunar tables, for which the Board of Longitude presented his widow with the sum of £3000, being part of the reward that was offered for the discovery of longitude. In addition to these labours, Mayer constructed an accurate catalogue of 992 fixed stars; he observed the proper motions of several of these bodies; and he delineated an excellent map of the Moon's disk, from a number of observations on the longitude and latitude of the lunar spots.

D'Alembert is celebrated for his solution of the problem respecting the precession of the equinoxes, of which we shall speak more at large hereafter. Euler concluded from certain investigations that the inequalities of Jupiter and Saturn, which were considerable, were all periodical; and increased, diminished, and vanished, after intervals of a certain number of days. By a comparison with actual observations, Mr. Mayer, of Gottingen, obtained a com-

plete confirmation of Euler's theoretical results; hence it was inferred that the radius of the Earth was disturbed in a similar way by the motion of Jupiter, Venus, and the Moon, and the Academy of Sciences offered their prize, in 1756, for the best theory on the subject. Euler carried away the prize, and established a general theory of the action of two planets upon one another. It appeared from these investigations, that the change in the obliquity of the ecliptic was owing to the action of the other planets upon the Earth; and Euler demonstrated, that this change, amounting to 50″ in a century, was periodical, and alternately increased and diminished in certain periods of unequal length.

[We to be continued.]

The Naturalist's Diary.

Soon as the morning trembles o'er the sky,
And, unperceived, unfolds the spreading day;
Before the ripened field the reapers stand
In fair array.—

THE powerful influence of the solar rays now contributes to ripen the various sorts of grain, which are benevolently given for the food of man and cattle. Fine weather is very desirable, that the principal source of the farmer's wealth may be safely housed; for sudden storms beat down the nearly ripe corn, and materially injure it. The time of commencing the harvest varies greatly in different districts. It is usually begun in the southern and midland parts of the kingdom towards the end of July, but principally at the beginning of this month; in the northern districts of Scotland, the harvest does not commence until the first or second week in September; and it is but rarely that, in these parts of England, it is finished, even in the most favourable situations, before the end of October; and not unfrequently this time is protracted till the middle of November.

About the 11th of August, the *puffin (alca arctica)* migrates. Priestholme, or Puffin's Island, about three quarters of a mile from the Isle of Anglesea, abounds with these birds; and their flocks, for multitude, may be compared to swarms of bees.—*(See T. T. for* 1814, pp. 215, 216.*)*

About the middle of the month, the *swift* disappears, and probably migrates to more southern regions. Rooks begin to roost in their nest trees, and young broods of goldfinches *(fringilla carduelis)* appear; lapwings *(tringa vanellus)* and linnets *(fringilla linota)* congregate; the nuthatch chatters; and, towards the end of the month, the redbreast is again heard.

At the beginning of the month, melilot *(trifolium officinale)*, rue (*ruta graveolens*), the water parsnep (*sysimbrium nasturtium*), horehound (*marrubium vulgare*), water mint (*mentha aquatica*), the orpine (*sedum telephium*), and the gentiana amarella, have their flowers full blown. The purple blossoms of the meadow saffron (*colchicum autumnale*) now adorn the low moist lands. The number of plants in flower, however, is greatly lessened in this month, those which bloomed in the former months running fast to seed. But the scarcity of flowers is amply repaid by an abundance of fruits of various kinds and hues:—

> The mealy *plum*
> Hangs purpling, or displays an amber hue;
> The luscious *fig*, the tempting *pear*, the *vine*,
> Perchance, that in the noontide eye of light
> Basks glad in rich festoons. The downy *peach*
> Blushing like youthful cheeks; the *nectarine* full
> Of lavish juice.— RIDLEY.

Heaths and commons are now in all their beauty; the flowers of the various species of heath (*erica*) covering them with a fine purple hue. Ferns also begin to flower, the commonest sort of which is the fern or brakes (*polypodium filix-mas*); but the female (*pteris aquilina*) is the most beautiful plant.

Insects still continue to swarm; they sport in the sun from flower to flower, from fruit to fruit, and subsist themselves upon the superfluities of nature.

Flies abound in the windows: the apis manicata, or solitary bee, and the white moth (*phalana pacta*), are observed. The ptinus pectinicornis also makes its appearance in this month. The larvæ of this insect are very destructive to wooden furniture, boring holes in tables, chairs, bed-posts, &c.;—they are much inclined to deposit their eggs in beech, hence this wood is less fit for the manufacture of domestic utensils.

The common glow-worm may be seen in abundance, in the month of August, when the earth is almost as thickly spangled with them as the cope of heaven is with stars. The glow-worm, like the cricket, lady-cow, and many other insects, makes but little use of its wings; for they are seldom seen on any situation more elevated than the summit of a barley-ear, or a stunted furze-bush. It is, therefore, somewhat difficult to account for the error committed by Thomson, in his enchanting poem, where he describes the glow-worm as 'lighting its gem on every hedge.' The glow-worm is generally found on banks under hedges, and sometimes in the interstices of rugged elm-roots, and the foundations of buildings.

The luminous appearance of the glow-worm has caused it to attract the notice of most of our rural poets, and all of them, except Thomson, have considered it as a crawling reptile, an inhabitant of the herbage. In the third of Moore's Fables for the Female Sex, 'The Nightingale and Glow-worm', the author makes the songster, previously to devouring the boasting insect, address it thus:

Deluded fool, with pride elate,
Know 'tis thy beauty brings thy fate:
Less dazzling, long thou might'st have lain
Unheeded on *the velvet plain*;
Pride, soon or late, degraded mourns,
And beauty wrecks whom she adorns.

Some of the most splendid butterflies seen in this month are, the *papilio Machaon*, commonly known as the swallow-tailed butterfly, of a beautiful yellow, with black spots or patches along the upper edge of the superior wings: all the wings are bordered with a deep edging of black, decorated by a double row of crescent-shaped spots, of which the upper row is blue, and the lower yellow. The under wings are tailed, and are marked at the inner angle or tip with a round red spot, bordered with blue and black. Three others are particularly worthy of notice: (1) The peacock butterfly (*Papilio Io*), of an orange brown colour, with black bars intersected by spaces of yellow; (2) the admirable butterfly (*Papilio Atalanta*), of the most intense velvet black colour, with a rich carmine-coloured bar across the upper wings, which are spotted towards the tips with white; and (3) The *papilio paphia*, an highly elegant insect of a fine orange chesnut colour above, with numerous black spots and bars: it is usually found in the neighbourhood of woods. To these may be added, the black-eyed marble butterfly (*papilio semele*), and the small golden black spotted butterfly (*papilio phlæas*).

The southern counties of England, particularly Surrey and Kent, now yield their valuable produce of *hops* in this month. The common hop (*humulus lupulus*) is propagated either by nursery plants, or by cuttings.

Towards the end of the month, the wild orach (*chenopodium album*), the wild clary (*salvia verbenaca*), the sweet gale (*myrica gale*), the golden rod (*senecio paludosus*), the milk-thistle (*carduus marianus*), and ladies traces (*ophrys spiralis*), have their flowers in full bloom.

Several *maritime* plants flower this month;—glasswort (*salicornia herbacea*), and grass-wrack (*zostera marina*), on sea coasts; the samphire (*crithmum maritimum*), and the *asparagus officinalis* among

rocks. On *sandy shores* may be seen the sea campion or catch-fly (*silene maritima*), sea spurge (*euphorbia paralia*), and lavender cotton (*santolina maritima*). On *sea shores* are found the sea-stock (*cheiranthus sinuatus*), and sea wormwood (*artemisia maritima*).

SEPTEMBER.

SEPTEMBER is composed of *septem*, seven, and the termination *ber*, like *lis* in *Aprilis*, *Quintilis*, *Sextilis*. This rule will also apply to the three following months, Octo-ber, Novem-ber, Decem-ber. Our Saxon ancestors called it *Gerst-monat*, 'for that barley which that moneth commonly yeelded, was antiently called gerst.'

Remarkable Days.

1.—SAINT GILES.

GILES, or Ægidius, was born at Athens, but after he had disposed of his patrimony in charitable uses, came to France in the year 715. He lived two years with Cæsarius, Bishop of Arles, and afterwards retired into solitude. Charles Martel, when hunting, found him in his hermit's cell, and, pleased with his unaffected piety and sanctity of manners, erected an abbey for him at Nismes, of which he was constituted abbot. He died in the year 795.

2.—LONDON BURNT.

The fire of London broke out on Sunday morning, September 2d, 1666, O.S.; and being impelled by strong winds, raged with irresistible fury, nearly four days and nights; nor was it entirely mastered till the fifth morning after it began. This most destructive conflagration commenced at the house of one Farryner, a baker, in Pudding-lane, near [New] Fish-street Hill, and within ten houses of Thames-street, into

which it spread within a few hours; nearly the whole of the contiguous buildings being of timber, lath, and plaster, and the whole neighbourhood presenting little else than closely confined passages and narrow alleys. The fire quickly spread, and was not to be conquered by any human means.

The immense property destroyed in this dreadful time cannot be estimated at less than *ten millions* sterling. Amid all the confusion and multiplied dangers that arose from the fire, it does not appear that more than SIX persons lost their lives. Calamitous as were the immediate consequences of this dreadful fire, its *remote effects* have proved an incalculable blessing to subsequent generations. To this conflagration may be attributed the complete destruction of the PLAGUE, which, the year before only, swept off 68,500 persons!! To this tremendous fire we owe most of our grand public structures—the regularity and beauty of our streets—and, finally, the great salubrity and extreme cleanliness of a large part of the city of London.

7.—SAINT EUNERCHUS.

Eunerchus, or Evortius, was bishop of Orleans, and present at the council of Valentia, A. D. 375. The circumstances of his election to this see were considered as miraculous, and principally ascribed to a dove, which alighted upon his head in consequence of the prayers of the electors. Other wonderful effects of his own prayers are attributed to him; such as extinguishing fire in the city almost instantaneously; finding a large pot of gold, which had long lain concealed under the ruins of a church, and which proved nearly sufficient to defray the expenses of rebuilding it; the conversion of 7000 infidels in the space of three days only; and, lastly, foretelling not only the time of his own death, but nominating a successor in the person of Arianus.

8.—NATIVITY OF THE VIRGIN MARY.

A concert of angels having been heard in the air

to solemnize this important event, the festival was appointed by Pope Servius about the year 695. Innocent IV honoured this feast with an octave in 1244, and Gregory XI, about the year 1370, with a vigil.

14.—HOLY CROSS.

This festival was first observed in the year 615, on the following occasion: Cosroes, King of Persia, having plundered Jerusalem, carried away large pieces of the cross which had been left there by the Empress Helena. Heraclius, the emperor, soon afterwards engaged and defeated him, and recovered the cross: but bringing it back in triumph to Jerusalem, he found the gates shut against him, and heard a voice from heaven saying, that the *King of Kings* did not enter into that city in so stately a manner, but *meek and lowly, and riding upon an ass.* The emperor then immediately dismounted from his horse, and walked through the city barefooted, carrying the cross himself. The *holy-rood,* or cross, when perfectly made, had not only the image of our Saviour extended upon it, but the figures of the Virgin Mary and St. John, one on each side; in allusion to John xix, 26,—'*Christ on the cross saw his mother, and the disciple whom he loved, standing by.*'

17.—SAINT LAMBERT.

Lambert was Bishop of Utrecht, in the time of King Pepin I; but, reproving the king's grandson for his irregularities, he was cruelly murdered at the instigation of an abandoned woman. Being canonized, he obtained, at first, only a simple commemoration in the calendar; but Robert, Bishop of Leeds, in a general chapter of the Cistercian order, procured a solemn feast to his honour in the church in 1240.

21.—SAINT MATTHEW.

In the year 64 or 65 Matthew wrote his Gospel in Hebrew, which was afterwards translated into Greek.

After many labours and miracles, he closed his life at Nadabar in Ethiopia, probably by martyrdom.

The *Jews* observe this day as a kind of festival, on account of the death of the Spies that brought an evil report of the Holy Land; the history of which is to be found in Numbers xiii.

22.—CORONATION OF KING GEORGE III.

His present Majesty was crowned on the 22d of September, 1761. The form of the oath, and the manner of taking it, may be seen in T. T. for 1814, p. 228-230.

26.—OLD HOLY ROOD. See HOLY CROSS, p. 257.

26.—SAINT CYPRIAN.

He was an African by birth, of a good family and well educated. Before his conversion he taught rhetoric; but by the persuasion of Cæcilius, a priest, he became a Christian. He gave all his property to the poor; and was elected Bishop of Carthage, A. D. 248. He behaved with great courage and resolution in the Decian persecution, and openly invited the people to constancy and perseverance: this conduct so enraged the Pagans, that he soon fell a victim to their fury, and suffered martyrdom under Valerianus and Gallienus, in 258.

29.—SAINT MICHAEL.

Saint Michael was an archangel who presided over the Jewish nation, and had an army of angels under his command and conduct; he fought also with the Dragon or Satan, and his angels; and contending with the Devil, he disputed about the body of Moses. See Rev. xii, 7; Jude 9. This festival has been kept with great solemnity ever since the sixth century.

There is an old custom still in use, of having a roast goose for dinner on Michaelmas-day; and it is a popular saying, that, 'if you eat goose on Michaelmas-day, you will never want money all the year round.'

About this time of the year, it has been, and still

continues, the custom to elect the governors of towns and cities. For the ceremonies observed by the SHERIFFS OF LONDON, when they take their oaths at Westminster, see T. T. for 1814, p. 232, 288.

On the election of a *bailiff* at *Kidderminster*, the inhabitants assemble in the principal streets, *to throw cabbage stalks at each other*. The town-house bell gives signal for the affray: this is called lawless hour. This done (for it lasts an hour), the bailiff elect and the corporation in their robes, preceded by drums and fifes (for they have no waits), visit the old and new bailiff, constables, &c. &c. attended by the mob. In the mean time the most respectable families in the neighbourhood are invited to meet and fling apples at them on their entrance. More than forty pots of apples have been expended at one house.—(*Gent. Mag.* for 1790, vol. lx, part 2, p. 1109.)

30.—SAINT JEROME.

Jerome was born in a town called Stridon, on the confines of Pannonia and Dalmatia. He translated the Old Testament into Latin: this version, now styled the *Vulgate*, is the only one used or allowed by the Romish church. He died in the eightieth year of his age, A.D. 422.

Astronomical Occurrences.

Precession of the Equinoxes.

THE word precession, when applied to the equinoxes, refers to a very slow insensible motion, by which they change their place, going backward, or to the west, that is, as astronomers call it, *in antecedentia*, or contrary to the signs. It is completely ascertained that the pole, the two solstices, the equinoxes, and all the other points of the ecliptic, have a retrograde motion, and are moving perpetually from east to west, or from Aries to Pisces; by means of which the equinoctial points are carried further and further back

among the preceding signs of stars, at the rate of about fifty seconds each year, which retrograde motion is called the precession, or sometimes the retrocession, of the equinoxes. As then the fixed stars remain immoveable and the equinoxes go backward, the stars will seem to move more and more eastward with respect to them; whence the longitudes of the stars, which are reckoned from the first point of Aries, are continually increasing. On this account, the interval of time between any equinox, and that same equinox, in the following revolution of the earth, which is called the *tropical* year, is some minutes shorter than the *sidereal* year, or the period in which the Earth revolves from one point of her orbit to the same point again; and, because the retrograde motion of the equinoctial points thus advances during the time of every equinox a little sooner than it would otherwise have happened, this phenomenon is called the 'precession of the equinoxes.'

Hence it is that the constellations have all changed the places assigned them by the antient astronomers: in the time of Hipparchus, the equinoctial points were fixed to the first stars of Aries and Libra; but the signs are now no longer in the same points; and the stars which were then in conjunction with the Sun, when he was in the equinox, are now a whole sign, or thirty degrees, to the east of it; thus, the first star of Aries is now in that portion of the ecliptic called Taurus; and the first star of Taurus now resides in Gemini, and Gemini is advanced into Cancer. By this retrograde motion the equinoxes will have made their revolution westward, and will be returned to Aries again, or the constellations will have made theirs eastward, and will again fall into their former places, with regard to the equinoxes, in 25,816 years, according to Tycho Brahè; in 25,920 years, according to Ricciolus; and in 24,800, according to Cassini; and then, and not before, the same stars which at present describe the equator, tropics, and polar

circles, &c. by the Earth's diurnal motion, will describe them over again.

By some astronomers of high name, in antient and modern times also, the equinoctial points are supposed to be immoveable, and they have ascribed that change of distance of the stars from it to a real motion of the orb of the fixed stars, which they supposed to have a slow revolution about the poles of the ecliptic; so as that all the stars perform their circuits in the ecliptic, or its parallels, in the space of 25,920 years, after which they should all return again to their former places.

This period the antients called the Platonic or great year; and imagined, that at its completion every thing would begin as at first; and all things come round in the same order as they have already done.

The physical cause of the precession of the equinoxes, Sir Isaac Newton demonstrates, arises from the broad or spheroidal oblate figure of the Earth, which itself arises from the Earth's rotation around its axis; for as more matter is accumulated all round the equatorial parts than any where else on the Earth, the Sun and Moon, by attracting this redundance of matter, bring the equator sooner under them, in every return towards it, than if there was no such accumulation.

In order further to illustrate the operation of this cause, and to evince its effect, we should consider how the action of the Sun produces the retrograde motion of the nodes of the Moon; as it will follow, from the same principles, that if a planet revolved about the Earth near to its surface in the plane of the equator, its nodes would also go backward, though with a slower motion than those of the Moon, in proportion as its distance from the centre of the Earth was less than that of the Moon. Suppose the number of such planets to be increased till they touch each other, and form a ring in the equator, and the nodes of this ring would go backward in the same manner as the nodes of the orbit of any one planet

revolving there. Suppose then this ring to adhere to the Earth, and its nodes would still go backward, but with a much slower motion, because the ring must move the whole Earth, to which it is supposed to adhere. The elevation of the equatorial parts of the Earth has the same effect as such a ring would have, excepting only that the motion of the nodes of the equator, or of the equinoctial points, is slower, because the accumulated parts of the Earth, above a spherical figure, are diffused over its surface, and have a less effect than if they were all collected in the place of the equator, in the form of a ring. The Moon has a greater force on this ring than the Sun, on account of her less distance from the Earth, and they both contribute to produce the retrograde motion of the equinoctial points; the motion, however, produced by both is so slow, that those points will not finish a revolution in less than about 25,000 years. Sir Isaac Newton has determined the quantity of this motion from its causes, and finds it, as deduced from the theory, to be consonant with the observations of astronomers. We shall here add, that there is another effect of the action of the Sun and Moon on this ring, which is too small to be sensible in astronomical observations; their action on the ring makes its inclination to the ecliptic to decrease and increase, by turns, twice every year.

Allowing the case to be as above stated, and since the plane of the Moon's orbit is at one time above ten degrees more inclined to the plane of the equator than at another, it is reasonable to conclude, that the part of the whole annual precession, which arises from her action, must, in different years, be varied in its quantity; whereas the plane of the ecliptic, in which the Sun appears, keeping always nearly the same inclination to the equator, that part of the precession, which is owing to the Sun's action, may be the same every year; and hence it follows, that, although the mean annual precession, proceeding

from the joint actions of the Sun and Moon, were 50″, or 50¼″, yet the true annual precession might sometimes exceed, and sometimes fall short, of that mean quantity, according to the various situations of the nodes of the Moon's orbit; and Dr. Bradley, from a variety of observations, found this to be the case, or that the precession of the equinoctial points varies; nor are astronomers entirely agreed as to the quantity of the variation, so as to establish what the mean precession is. Dr. Bradley assumes the mean precession to be one degree in seventy-one years and a half. According to this estimate, the Platonic or great year would be equal to 25,740 solar years.

Sir Isaac Newton, in determining the quantity of the annual precession from the theory of gravity, upon supposition that the equatorial is to the polar diameter of the Earth as 230 is to 229, finds the Sun's action sufficient to produce a precession of 9⅛″ only; and collecting from the tides the proportion between the Sun's force and the Moon's to be as 1 to 4½, he settles the mean precession, resulting from their joint actions, at 50″. But since the difference between the polar and equatorial diameter is found, by the late observations of the gentlemen of the Royal Academy of Sciences at Paris, to be greater than what Sir Isaac had computed it to be, the precession arising from the Sun's action must likewise be greater than what he has stated it at, nearly in the same proportion.—See Maclaurin's View of Sir Isaac Newton's Discoveries, and Rees's Cyclopedia.

Table of the Sun's Rising and Setting every 10th Day:

Friday	1st, Sun rises	5 h. 13 m.	Sun sets 6 h. 47 m.
Monday	11th, - - - - -	5 h. 33 m.	- - - - 6 h. 27 m.
Thursday	21st, - - - - -	5 h. 52 m.	- - - - 6 h. 8 m.

On the 25th is equal day and night.

Table of Equation of Time for every fifth Day.—[See January.]

			m.	s.
Friday	1,	to the time shown on the dial add	0	2
Wednesday	6,	from ditto subtract	1	32
Monday	11,	ditto	3	14
Saturday	16,	ditto	4	59
Thursday	21,	ditto	6	44
Tuesday	26,	ditto	8	28

The Sun enters the sign Libra on the 23d, at 51 minutes past 10 in the evening.

Mercury is stationary on the 13th, and Mars on the 22d.

It is new Moon or change on the 3d, at 21 minutes past 2 o'clock in the afternoon; she enters her first quarter at noon on the 10th; is full at 14 minutes after 4 on the 18th; and enters the last quarter on the 26th, at 57 minutes after 7 in the morning.

The Moon will be on the meridian on the

13th day,	at 36 m. past 8	in the evening.
14th,	25	9
15th,	13	10
16th,	58	10
17th,	39	11
18th,	22	12

The eclipses of Jupiter's first satellite are not visible this month.

Mercury's inferior conjunction will take place at half past 5 on the 4th.

HISTORY OF ASTRONOMY.

[Continued from p. 251.]

Dr. Bradley continued astronomer royal till 1762, when he was succeeded by Mr. Bliss, who retained the office only two years, when death put an end to his career; and he was succeeded by Dr. Maskelyne.

Of this gentleman, so distinguished among modern astronomers, we shall speak rather at large. He was born in 1732, and received the earlier parts of his education at Westminster school, where he continued from the age of nine till he was fifteen years old, and made a distinguished progress in classical learning, though at this period he manifested a decided turn for astronomical pursuits. This predilection was considerably increased, by witnessing the memorable solar eclipse of 1748, of which an interesting account is given in our last month's Occurrences. It may be readily imagined, that so unusual and striking a phenomenon must have made a strong impression on his susceptible mind, and stimulated him to those exertions which led to his future eminence. From this period he applied himself with ardour to the study of astronomy and optics, but soon experienced the necessity of laying a proper mathematical foundation, on which he might erect those noble sciences: he therefore applied himself to the elements of geometry and algebra, which he mastered in a short space of time without the aid of an instructor.

In 1749 he was entered at the University of Cambridge, where, in due course, he took his several degrees, of which the last was in the year 1777. As soon as he was of age to be admitted into holy orders, he was ordained to the curacy of Barnet, where he officiated some time, but he, even then, devoted every leisure hour to the study of practical astronomy. In the year 1758 he was elected a Fellow of the Royal Society, and very soon after he became an important contributor to the Philosophical Transactions. By this learned body, who, at that time, paid particular attention to astronomical and mathematical pursuits, he was selected to go to the island of St. Helena, to observe the transit of Venus over the Sun's disk, which was to take place in 1761. As this observation was to settle the parallax, it excited much attention, and great preparations were

made in different countries for observing it with accuracy. Two other astronomers, viz. Mr. Charles Mason, and Mr. Jeremiah Dixon, were sent for the same purpose to Bencoolen, and his present Majesty, George III, readily afforded them all the supplies which they required in the several expeditions. Louis XV, King of France, likewise sent out astronomers to observe the transit at Pondicherry, the island of Roderigo, and to the north of Siberia.

Dr. Maskelyne sailed for St. Helena in the Seahorse frigate, and remained ten months in the island, making astronomical observations and philosophical experiments. Owing to the cloudy state of the weather, he was not completely successful in his attention to the transit of Venus; but his voyage answered a more important purpose: it afforded him an opportunity of making lunar observations, which were now made for the first time with effect. This method, to which we have before referred, of finding the longitude at sea, had been long contemplated as a grand desideratum in navigation, and plans and preparations had been made for the purpose by Flamstead, Newton, La Caille, Halley, Euler, Bradley, Mayer, and others, but the honour was reserved for Dr. Maskelyne to reduce their theories to successful practice. This he was enabled to do by means of Hadley's Quadrant, recently invented, and Professor Mayer's Lunar Tables.

Dr. Maskelyne, during his voyage out and home, exercised the officers on board in taking lunar observations, and taught them to clear the distances from the effects of parallax and refraction, and thence to find the longitude within certain limits. While on the island, he made accurate observations on the tides, the variation of the compass, and the comparative gravity of bodies there and at London. He also observed the annual parallax of Sirius, and the horary parallaxes of the Moon. Shortly after his return from St. Helena he published 'The British Mariner's Guide,' which contained, among various

new and practical illustrations and articles in nautical astronomy, rules and examples to expedite the working lunar observations; but in order to shorten and simplify these laborious operations, other tables and calculations were still wanted, which he afterwards supplied by the Nautical Almanack, or Ephemeris, which is an almanack published by anticipation for several years beforehand, for the convenience of ships going out upon long voyages: it is adapted to the meridian of Greenwich, and contains, besides many particulars to be found in other almanacks, the Sun's longitude, right-ascension, declination: the longitudes and latitudes of the planets, and the times of their passing the meridian: the times, quantities, and other particulars of solar and lunar eclipses, together with those of Jupiter's satellites: the distances of the Moon from the Sun and certain fixed stars; and, in general, the times when any remarkable celestial appearances may be seen at or near the place for which the ephemeris is calculated. The first nautical almanack was published in 1767, and it has been regularly published ever since up to the year 1816, a copy of which is in our hands. Dr. Maskelyne published likewise requisite tables to be used in connection with the Nautical Ephemeris: these publications are quite sufficient to hand down the Doctor's name to posterity with high honour, had he done nothing else for science and his country. But we shall find his exertions were not confined to single objects, nor suspended from useful and beneficial pursuits, till death laid upon him his cold hand.

In 1763 he undertook another scientific voyage by appointment of the Lords of the Admiralty and the Board of Longitude. He sailed to Barbadoes for the purpose of ascertaining the longitude of that island by astronomical observations; to determine the rate of going of Mr. Harrison's new time-keeper; and to try a marine chair invented by Mr. Irvin, and intended for making steady observations at sea, but

which, after every trial had been given to it, was found not to answer. He was, moreover, in the course of his voyage, to take lunar observations with a curious sextant made by Hadley, and to determine the longitude by the eclipses of Jupiter's satellites, and the occultations of certain fixed stars by the Moon. It was, as we have already observed, in the year 1764 that he was most honourably appointed to the office of Astronomer-Royal. His reputation stood so high in the Royal Society, as a mathematician and astronomer, while his experience, gained by his voyages to distant parts of the globe, and, above all, his success in establishing the lunar observations, seemed to render him peculiarly well qualified to carry into effect the purpose for which the Royal Observatory was originally established, viz. that of preparing tables for finding the longitude at sea. For want of this species of knowledge, not only single ships, but fleets themselves, have been lost, or run into scenes of the utmost peril; circumstances which had induced government to offer immense rewards for practical methods of determining the problem. So soon as Mr. Flamstead had been appointed to the office of Astronomer-Royal, he was directed by King Charles II, "to apply himself with all diligence to the rectifying the tables of the motions of the heavens, and the places of the fixed stars, in order to find out the much-desired longitude at sea, for the perfecting the art of navigation." Thus the office of Astronomer-Royal was justly considered to be of great national importance; and Dr. Maskelyne's appointment to it gave general satisfaction to all those who were capable of understanding the nature of the duties to which he was appointed, and of appreciating the talents of the man so appointed.

Soon after Dr. Maskelyne was inducted to his office, he laid before the Board of Longitude the plan of the Nautical Almanack, to which we have already referred, and which has been ever regarded as

the most useful work on practical astronomy ever published. In so great estimation is it held by foreign astronomers, that they have generally and implicitly adopted its computations, and acknowledged its superior accuracy. M. Lalande, in giving an account of similar publications, says, 'Le Nautical Almanac de Londres est l'Ephemeride la plus parfaite qu'il y ait jamais eu.' The tables, also, have been frequently republished with additional ones, and other improvements, by many of our practical astronomers.

[To be continued.]

The Naturalist's Diary.

The orchards swell the ruby-tinctured birth;
The vermil-gardens breathe the spicy soul.

In autumn, the promise of the spring is fulfilled. The silent and gradual progress of maturation is now completed; and human industry beholds, with triumph, the rich productions of its toil. The vegetable tribes disclose their infinitely various form of *fruit*; which term, while, with respect to common use, it is confined to a few peculiar modes of fructification, in the more comprehensive language of the Naturalist, includes every product of vegetation, by which the rudiments of a future progeny are developed and separated from the parent plant. These are in part collected, and stored up by those animals for whose sustenance, during the ensuing sleep of nature, they are provided. The rest, furnished with various contrivances for dissemination, are scattered by the friendly winds, which, in the latter end of this, and the commencement of the ensuing month, begin to blow over the surface of the earth, which they are to clothe and decorate.

Partridges (*tetrao perdix*) are in great plenty at this season of the year: they are chiefly found in tem-

perate climates, but no where in such abundance as in England. Partridges pair early in the spring: about the month of *May*, the female lays from fourteen to eighteen or twenty eggs, making her nest of dry leaves or grass upon the ground. The young birds learn to run as soon as hatched, frequently encumbered with part of the shell sticking to them, and picking up slugs, grain, ants, &c.

These are few plants in flower this month except saffron *(crocus sativus)* and ivy (*hedera helix*). Among the *maritime* plants may be named, the marsh glasswort (*salicornia herbacea*), and the sea-stork's bill (*erodum maritimum*), on *sandy shores;* and the officinal marsh-mallow (*althæa officinalis*) in *salt marshes.*

Herrings (*clupea*) pay their annual visit to England in this month, and afford a rich harvest to the inhabitants of its eastern and western coasts. Exclusive of the various methods of preparing this fish for sale, in different countries, an immense quantity of oil is drawn from it, forming a great and important commercial article among the northern nations.

Various of the feathered tribe now commence their autumnal music:

> The *thrush*, the *blackbird*, and the *woodlark* now,
> Cheerer of night, their pleasing song resume;
> The *stone-curlew* his chattering note repeats;
> And the *wood-owl* continual breaks the depth
> Of sylvan darkness with discordant moans.

Among the few insects that appear in this month, are the *phalæna russula*, and the saffron butterfly (*papilio hyale*). The snake *sloughs*, or casts its skin.

The principal harvest of apples is about the end of this month; and the counties of Worcestershire, Somersetshire, and Devonshire, are busily employed in cider-making. *Perry* is made from pears, and is extremely grateful, being preferred by many persons

to cider. Hazel-nuts are now ripe; and the filberd-tree is laden with its agreeable fruit[1].

The oak begins to shed its acorns, and the beech nuts fall; both of which are termed mast. A luxurious pasturage is afforded for such *hogs* as are kept on the borders of forests, for about six weeks, from the end of September.

[1] Mr. Park's rustic plaint, entitled the 'Filberd Tree,' cannot fail of being acceptable to every lover of delicate sentiment, and elegant poetry:—

I had a little comely cot,
As neat as cottage well could be;
And near it rose a garden-plot,
Where flourished one embowering tree—
Ah, 'twas a tree of trees to me!

To my neat cot it gave a name,
A Filberd was my favourite tree;
Who saw it, praised it into fame,
And e'n my neighbours, envying me,
Confessed—it was a goodly tree.

Its graceful branches o'er my head
Waved wide an arched canopy;
And its broad leaves benignly spread
A fan of green embroidery,
That shaded all my family.

It was a screen from wind or sun,
A veil from curiosity;
And when its summer bloom was gone,
We still could feast, with social glee,
On its autumnal fruitery.

E'en winter oft has seen it gay,
With fretted frost-work spangled o'er;
While pendants drooped from every spray,
And crimson budlets told once more
That spring would all its charms restore!

But I have left that comely cot,
Where blossoms now my favourite tree;
And I possess an ampler spot,
Which boasts of more variety,
And more enraptures all but me;

For what I once have helped to rear,
Have treasured with a guardian eye,
To my weak heart must still be dear,
To my fond thought will oft be nigh—
Thee, Filberd, still for thee I sigh!

The autumnal equinox happens on the 22d of September, and, at this time, the days and nights are equal all over the earth. About this period, heavy storms of wind and rain are experienced, as well as at the vernal equinox.

The unvarying symptoms of approaching winter, which occur in this month, now warn several of the winged tribes to prepare for their aërial voyage to those happy climates of perpetual summer, where no deficiency of food or shelter can ever distress them; and, about the same time, other fowls of hardier constitution, which are contented with escaping the iron winters of the arctic regions, arrive to supply the vacancy. Thus the striking scenes afforded by that wonderful part of the economy of Nature, the migration of birds, present themselves at this season. The chimney or common swallow (*hirundo rustica*) disappears about the end of the month.

On the Migration of Birds.

[Continued from p. 158.]

The principal food of the birds of passage, while in Great Britain, is the fruit of the white thorn or haws, which hang on our hedges in winter in prodigious plenty; but where they breed, and seem to be most at ease, as in Sweden, &c. there are no haws; nor indeed in many of the countries through which they journey on their way; so that it is evident they change their food in their passage.

The manner in which the birds of passage journey to their southern abodes is supposed to vary, according to the different structure of their bodies, and their power of supporting themselves in the air. The birds with short wings, such as the redstart, blackcap, &c. though they are incapable of such long flights as the swallow, or of flying with such celerity, yet may pass to less distant places, and by slower movements. Swallows and cuckoos may perform their passage in a very short time.

Swallows are often observed, in innumerable flocks, on churches, rocks, and trees, before their departure

hence, and their return here in almost equal numbers has been proved by several relations of undoubted credit. The state of the swallow tribes, when no longer seen in our northern regions, has given rise to much speculation among naturalists.

The advocates for the migration of swallows produce many incontrovertible facts to prove their hypothesis; while those who insist upon their torpidity or winter sleep are equally industrious in their researches. We have before adverted to this subject[1]; it remains therefore only to give some additional observations on both sides of the question. Mr. Daines Barrington, in a curious essay on this subject (*Phil. Trans.* vol. lxii, p. 265), has adduced many arguments and facts, to prove, that no birds, however strong and swift in their flight, can possibly fly over such large tracts of the ocean as has been commonly supposed. He is of opinion, therefore, that the swallows mentioned by M. Adanson, instead of being on their passage from Europe, were only fluttering from the Cape de Verde Islands to the continent of Africa; a much nearer flight, but to which they seemed to be unequal, as they were obliged, from fatigue, to alight upon the ship, and fall into the hands of the sailors. And Mr. Kalm, another advocate for the torpidity of swallows during the winter, having remarked, however, that he himself had met with them 920 miles from any land; Mr. Barrington endeavours to explain these, and similar facts, by supposing that birds discovered in such situations, instead of attempting to cross large branches of the ocean, have been forcibly driven from some coast by storms, and that they would naturally perch upon the first vessel they could see.

In a word, Mr. Barrington is farther of opinion, with some other naturalists, that the swallows do not leave this island at the end of autumn, but that they lie in a torpid state, till the beginning of summer, in

[1] See T. T. for 1814, pp. 249-251.

the banks of rivers, the hollows of decayed trees, the recesses of old buildings, the holes of sand banks, and in similar situations. Among other facts, Mr. Barrington communicated one to Mr. Pennant: 'That numbers of swallows have been found in old dry walls, and in sand hills, near the seat of the late Lord Belhaven in East Lothian; not once only, but from year to year; and that, when they were exposed to the warmth of a fire, they revived.'

These, and other facts of the same kind, are allowed to be incontrovertible; and Mr. Pennant, in particular, infers from them, 'that we must divide our belief relative to these two so different opinions, and conclude, that one part of the swallow tribe *migrate*, and that others have their winter quarters *near home*.'

Mr. Heerkens, a celebrated Dutch naturalist, in a Latin poem on 'The Birds of Friesland,' speaks in positive terms of the torpid state, and submersion, of the swallows:

> Ere winter his somnif'rous power exerts
> Six dreary months, the swallow tribes are seen
> In various haunts concealed; in rocks and caves,
> And structures rude, by cold benumbed, asleep;
> Bill within bill inserted, clust'ring thick:
> Or solitary some, of mate bereft.
> But, wonderful to tell! some lie immersed,
> Inanimate, beneath the frigid waves,
> As if a species of the finny kinds.

Mr. Heerkens, after reciting many instances, and producing in his notes several authorities, of swallows having been found in a torpid state, proceeds, in his poem, to describe very minutely their ascent out of the water. 'The drowsy birds appear on the shore, as if unconscious still of life. Some inhale the soft breeze, like one of the finny tribe exiled from its stream. Others, almost revived, essay, with busy bill, to assist their aged companions. All, at length, restored to the unrestrained use of their wings, range, in numerous flights, the aërial way.'

Two reasons have been adduced to prove this supposed submersion of swallows impossible. 'In the first place,' says Mr. Smellie, 'no land animal can exist so long without some degree of respiration. The otter, the seal, and water fowls of all kinds, when confined under the ice, or entangled in nets, soon perish; yet it is well known, that animals of this kind can remain much longer under water than those who are destitute of that peculiar structure of the heart which is necessary for any considerable residence beneath that penetrating element.' Mr. John Hunter, in a letter to Mr. Pennant, informs us, 'That he had dissected many swallows, but found nothing in them different from other birds as to the organs of respiration: that all those animals which he had dissected of the class that sleep during winter, such as lizards, frogs, &c. had a very different conformation as to those organs: that all those animals, he believes, do breathe in their torpid state; and as far as his experience reaches, he knows they do; and that, therefore, he esteems it a very wild opinion, that terrestrial animals can remain any long time under water without drowning.' Another argument against their submersion arises from the specific gravity of the animals themselves. Of all birds, the swallow tribes are perhaps the lightest. Their plumage, and the comparative smallness of their weight, indicate that Nature destined them to be almost perpetually on the wing in quest of food. From this specific lightness, the submersion of swallows, and their continuing for months under water, amount to a physical impossibility. Even water-fowls, when they wish to dive, are obliged to rise and plunge with considerable exertion, in order to overcome the resistance of the water. Klein's idea of swallows employing reeds and straws as means of submersion is rather ludicrous; for these light substances, instead of being proper instruments for assisting them to reach the bottom, would infallibly contribute to support

them on the surface, and prevent the very object of their intention. Besides, admitting the possibility of their reaching the bottom of lakes and seas, and supposing they could exist for several months without respiration, what would be the consequence? The whole would soon be devoured by otters, seals, and fishes of various kinds. Nature is always anxious for the preservation of its species. But, if the swallow tribes were destined to remain torpid during the winter months, at the bottom of lakes and seas, she would act in opposition to her own intentions; for, in a season or two, the whole genus would be annihilated. (*Philos. of Nat. Hist.* p. 481.)

This reasoning is very ingenious; but, on the other hand, the facts related above are very stubborn; and the celebrated Buffon does not hesitate to yield to the force of such strong and concurrent evidence. He had procured some chimney swallows, and kept them some time in an ice house, in order to ascertain whether *they* were of the torpid kind; and he thus relates the result of his experiment: 'None of them fell into the torpid state: the greater part died, and not one of them revived by being moved into the warmth of the sun. Those that had not long suffered the cold of the ice-house, had all their movements, and went out briskly. From these experiments I thought I might conclude, that this species of the swallow was not liable to that state of torpor and insensibility, which supposes, notwithstanding, and very necessarily, the fact of its remaining at the bottom of the water during the winter. Having had recourse, moreover, to the most credible travellers, I found them agreed as to the passage of swallows over the Mediterranean. And Mr. Adanson has positively assured me, that, during the long stay he made in Senegal, he observed the long-tailed swallow, the same with the chimney swallow we are now speaking of, arrive constantly in Senegal about the time it leaves France, and as constantly leave Senegal in the

spring. It cannot, therefore, be doubted that this species of the swallow passes from Europe into Africa in the autumn, and from Africa to Europe in the spring; of consequence it neither sleeps nor hides itself in holes, nor plunges into the water on the approach of winter. There is, beside, another well authenticated fact, which comes in proof here, and shows that this swallow is not reduced to a torpid state by cold, which it can bear to a certain degree; and if that degree is exceeded, it dies: for if we observe these birds toward the end of the warm season, we shall see them, a little before their departure, flying together in families, the father, the mother, and the young brood. Afterward several families unite, and form themselves into flocks more or less numerous in proportion as the time of their departure draws near. At last they go all together, three or four days before the end of September, or about the beginning of October. Still, however, some remain, and do not set off till a week, a fortnight, or three weeks after the rest: and some too there are which do not go at all, but stay and perish under the first rigours of the cold. These swallows that delay their flight, or never undertake it, are such as find their young too weak to follow them; such as have had the misfortune to have their nests destroyed after laying, and have been obliged to rebuild them a second or third time. They stay for the love of their little ones, and chuse rather to endure the rigour of the season than to abandon their offspring. Thus they remain some time after the rest for the purpose of taking their youth with them; and if they are unable to carry them off in the end, they perish with them.

'These facts, then, plainly demonstrate,' concludes M. Buffon, 'that the chimney swallows pass successively and alternately from our climate to another that is warmer; that they spend their summer here, and their winter there; and of consequence never fall into a state of insensibility. But, on the other hand, what

have we to oppose to the precise testimony of those who, on the approach of winter, have seen these swallows in troops throw themselves into the water; nay, not only this, but have seen them taken out in nests from beneath the ice? What answer shall we make to those who have beheld them in the torpid state, and seen them gradually recover motion and life, when they were brought into the warmth, and moved cautiously towards a fire? I know but of one means of reconciling these facts. We must suppose that the sleeping and the travelling swallow are of different species, though the difference, for want of attention, has not been observed.'—(*Histoire Naturelle des Oiseaux*, tome i.)

Thus this great philosopher concurs with Mr. Pennant, in his solution already mentioned, of the difficulty, by supposing two species, the *migrating* and the *sleeping* swallow. With respect to the principal objects of this wonderful instinct, that teaches such various kinds of the feathered race to migrate to different countries, it is obvious, from what has been already said, that they are food, temperature of air, and convenient situations for breeding.

Many other of the small billed birds that feed on insects disappear when the cold weather commences. The *throstle*, the *redwing*, and the *fieldfare*, which migrated in March, now return; and the *ring-ouzel* arrives from the Welsh and Scottish Alps to winter in more sheltered situations. All these birds feed upon berries, of which there is a plentiful supply in our woods, during a great part of their stay. The throstle and the redwing are delicate eating.

Towards the end of September the leaves of trees begin to put on their autumnal dress. Mr. Stillingfleet remarks, that, about the 25th, the leaves of the plane tree were tawny; of the hazel, yellow; of the oak, yellowish green; of the sycamore, dirty brown; of the maple, pale yellow; of the ash, a fine lemon colour; of the elm, orange; of the hawthorn, tawny yellow; of the cherry, red; of the hornbeam, bright

yellow; of the willow, still hoary. Yet many of these tints cannot be considered complete, in some seasons, till the middle or latter end of October.

When the harvest is gathered in, the husbandman prepares for seed-time; and the fields are again ploughed up for the winter corn, rye, and wheat, which are sown in September and October. The entrances to bee-hives are straitened, to prevent the access of wasps, and other pilferers.

OCTOBER.

THIS month was called *Domitianus* in the time of Domitian; but after his death, by the decree of the Senate, it took the name of October, every one hating the name and memory of so detestable a tyrant. It was called *wyn-monat*, or wine-month, by the Saxons.

Remarkable Days.

1.—SAINT REMIGIUS.

REMIGIUS was born at Landen, where he so closely pursued his studies, that he was supposed to lead a monastic life. After the death of Bennadius, he was, on account of his exemplary piety and extraordinary learning, chosen bishop of Rheims. He converted to Christianity not only King Clodoveus, but also a considerable part of his subjects; hence he is honoured by some devotees with the title of the French Apostle. After he had held his bishopric 74 years, he died at 96 years of age, A.D. 535. The cruise which he used was preserved in France, their kings being formerly anointed from it at their coronation.

The 5th of October, or the first of Tishri, is observed by the *Jews*, as the first day of their new year; and is also celebrated by them as the Anniversary of the World; and they blow horns, *Shaffer*, or the

Cornet, to excite in their remembrance that the Lord is the Heavenly King; and that, as such, they acknowledge and proclaim him. In Numbers xxix, it is described as the *Feast of Trumpets*. This festival is likewise preparatory to that of the *Day of Atonement*. On these days, prayers for a happy new year are much used in the Jewish assemblies.

6.—SAINT FAITH.

This virgin martyr suffered death under Dacianus, about the year 290, the most cruel torments being inflicted upon her. Vows of celibacy were highly esteemed in the early ages; and, even in our own times, many rites still exist in honour of the virgin state. Upon the decease of a virgin, *flowers* are yet strewed before the corpse by young girls dressed in *white*, as emblematic of innocence. Garlands also are, in some places, woven and attached to the beams of churches in which virgins have been buried.

The 8th of October is the third *Jewish* Fast of *Rush Hashonah*, kept on account of the return of some of the Jews from Babylon, after the destruction of the first Temple, who, with their governor, were treacherously murdered on their way. It is also the anniversary of the death of *Gedaliah*.—Oct. 10, Jewish Fast for the death of *Rabbi Akeba*.

9.—SAINT DENYS.

Saint Denys, or Dionysius, the Areopagite, was converted to Christianity by St. Paul. See *Acts* xvii. He was, at first, one of the Judges of the celebrated court of the Areopagus, but was afterwards made Bishop of Athens, where he suffered martyrdom for the sake of the gospel. There are several books which bear his name; but they are, no doubt, forgeries of the sixth century. The French say, that he was the first that preached the gospel among them, and for that reason consider him their tutelar saint; but for this supposition there is no ground, as Christianity was never preached in France until long after his decease.

The *Jews* observe the 12th of October in remembrance of judgment of death pronounced upon the persons concerned in making the *golden calf*. Exodus, chap. xxxii.

13.—TRANSLATION OF KING EDWARD THE CONFESSOR.

He was the youngest son of King Ethrelred; but as all his elder brothers were either dead, or had fled away, he succeeded to the crown of England in the year 1042. He collected all the most useful laws made by the Saxon and Danish kings. The additional title of Confessor was probably given him by the pope, for settling what was then called *Rome-Scot*, but now is better known by the name of *Peter's Pence*.

The ingenious and amusing HERRICK thus alludes to the '*Peter Penny*:'

Fresh strewings allow
To my sepulchre now,
To make my lodging the sweeter;
A staff or a wand
Put them in my hand,
With a penny to pay Saint Peter.

Who has not a cross
Must sit with the loss,
And no whit further must venture;
Since the porter he
Will paid have his fee,
Or else not one there must enter.

Who, at a dead lift,
Can't send, for a gift,
A pig to the priest for a roaster,
Shall hear his clerk say,
By yea and by nay,
No penny, no pater-noster.

The monks ascribed a number of miracles to Edward; even his vestments were reputed holy. His crown, chair, staff, spurs, &c. are still used at the coronation of our English kings.

The 15th of October, or *Yom Kipur*, is a very

strict *Jewish fast*, the observation of which is derived from *Leviticus*, chap. xxiii, verse 27. As the Jews are there commanded *to afflict their souls*, they observe a very strict fast from the evening of the 9th day to that of the 10th; and on this, deemed a *Sabbath of Sabbaths*, it is their invariable rule to abstain from all manner of work.

17.—SAINT ETHELDREDA.

She was a princess of distinguished piety, daughter of Anna, King of the East-Angles, and Hereswitha his queen, and was born about the year 630, at Ixning, a small village in Suffolk. In the year 673, she founded the conventual church of Ely, with the adjoining convent. Of this monastery she was constituted abbess, the monks and nuns living in society and regular order: it flourished for nearly two hundred years, but was destroyed, with its inhabitants, by the Danes, in 870. In *Bentham's History of Ely* are many curious particulars of this saint. See also T. T. for 1814, pp. 255-257.

18.—SAINT LUKE THE EVANGELIST.

Luke was born at Antioch, the metropolis of Syria, a place celebrated for the study of the liberal arts. The notion that he was a painter is without foundation, as it is not countenanced by antient writers. Dr. Lardner thinks that he might have been by profession a physician, as the expression 'beloved physician,' *Col.* iv, 14, seems to intimate. Luke lived a single life, and died in the 84th year of his age, about the year of Christ 70; probably, a natural death.

The 19th of *October* is the *Jewish Feast of Tabernacles*; but the most complete day of this festival is the 20th, and is called SUCCOTH, because all labour is avoided by the Jews, excepting that which relates to the preparation of their food. The word *Succoth* signifies Huts or Booths, in which the Jews were commanded to dwell seven days, and which is to be yearly observed for ever, to put them in remembrance that their forefathers, while they journied 40 years in the

desert before they came to the Land of Promise, used to dwell in huts or tents. The Jews were also commanded to take the fruit of the citron, the branches of the myrtle, and the leaves of the date or palm tree, which they now call *Louloe*, and also willows growing near the water, and with these they were to rejoice before the Lord. This is still observed in their places of worship, during the morning prayers, when they read the great *Hallel*, or thanksgiving, and other additional prayers.

This feast is also that of *Gathering in the Harvest*, which, like the rest, are kept two days. Four intermediate days are called *Chol Hamoed*. The seventh day, which is called *Hoshannah Rabba*, or the *Great Hosanna*, is kept still more strictly than the rest, by additional prayers, invoking the blessing of God upon the waters. At this time they hold in their hands an *Hoshannah*, composed of willow twigs, which, as growing near the water, reminds the Jews of the blessings of that element. In the evening, what is called the *Solemn Assembly* commences; and this, being the eighth day of the festival, is kept as strictly as the first and second, by prayers for rain. On the following day (the ninth), the five books of Moses are divided into fifty-four sections, to be read on the different sabbaths of the year; but, on this occasion, the last section and part only of the first are read.

25.—ACCESSION OF KING GEORGE III.

Upon the death of George II, his present Majesty came to the throne, on the 22d of September 1760.

25.—SAINT CRISPIN.

Two brothers, Crispinus and Crispianus, were born at Rome; whence they travelled to Soissons in France, about the year 303, to propagate the Christian religion. Being desirous, however, of rendering themselves independent, they gained a subsistence by shoe-making. It having been discovered that they privately embraced the Christian faith, and en-

deavoured to make proselytes of the inhabitants, the governor of the town immediately ordered them to be beheaded, about the year 308. From this time, the shoemakers chose them for their tutelar saints.

26.—PROCLAMATION OF KING GEORGE III.

His present Majesty was proclaimed King on the 26th of October 1760, the day after his accession to the throne.

28.—SAINT SIMON AND SAINT JUDE, *Apostles.*

Simon is called the *Canaanite*, from the Hebrew word *Cana*, to be zealous: hence his name of *Simon Zelotes*, or the Zealot, Luke vi, 15. After enduring various troubles and afflictions, he, with great cheerfulness, suffered death on the cross.

Jude is called both by the name of *Thaddæus* and Libbæus: Matt. x, 3, and Mark iii, 18. Jude, the brother of James: Jude, verse 1. And Judas, not Iscariot: John xiv, 22. He was of our Lord's kindred; '*Is not his mother called Mary, and his brethren James and Joses, and Simon and Judas?*' Matt. xiii, 55. After great success in his apostolic ministry, he was at last, for a free and open reproof of the superstitious rites of the Magi, cruelly put to death. He has left one epistle of universal concern to Christians.

Astronomical Occurrences.

Of the Quantity of Matter and Density of the Sun and Planets.

We have seen that there is a gravity extending from each body in the system on all sides, at equal distances from their centres, proportional to their quantities of matter. We know, from experience, the force of this power at the surface of our own earth, and have seen how to estimate its efficacy at any other distance. In order to be able to estimate all the powers in the system, directed to their different

bodies, it is necessary to determine the proportion of their quantities of matter to that of our earth. If this is once obtained, all the powers that operate in the system being known, it will require no more than a skilful application of geometry and mechanics to determine the motions and phenomena of the celestial bodies, which all flow from them.

To measure the matter in the Sun and planets was an arduous problem, and, at first sight, seemed above the reach of human art. But the principles of this philosophy afforded a natural and easy solution of it in the most important cases; and Sir Isaac Newton has determined the proportions of the matter that is in the Sun, Jupiter, Saturn, and the Moon, to that in our Earth; that is, he has shown how many Earths might form a Sun, a Jupiter, or a Saturn. To understand how he was able to discover this, we are to recollect that the matter in each of these is in the same proportion as the force of gravity towards them, at equal distances from their centres. We know the force of gravity towards our earth from the descent of heavy bodies, and also by calculating how much the Moon falls below the tangent of her orbit in any given time. We have no experience of any rectilineal descent of heavy bodies toward the Sun, Jupiter, or Saturn; but as the primary planets revolve about the Sun, and their satellites revolve about Jupiter and Saturn, by computing from their motions how much a primary planet falls below its tangent in any given time, and how much any of Jupiter's and Saturn's satellites fall below their tangents in the same time, we are able to determine the proportion which the gravity of a primary planet to the Sun, and of a satellite towards its primary, bears to the gravity of the Moon towards the Earth, in their respective distances; then, from the general law of the variation of gravity, the forces that would act upon them at equal distances from the Sun, Jupiter, Saturn, and the Earth, are computed; which give the proportion of the matter contained in these different bodies.

That the quantity of matter in Jupiter is greater than the quantity of matter contained in the Earth, we may easily learn, from the motion of his satellites, all of which revolve about his centre in less time than the Moon revolves about the Earth, and are all, excepting the first, at a greater distance from his centre than the Moon is from the Earth. The second satellite is farther distant from Jupiter than the Moon is from the Earth, in the proportion of 3 to 2, nearly; and moves in an orbit greater in the same proportion. But this satellite finishes its revolution in three days thirteen hours, which is less than a seventh part of the Moon's periodic time about the Earth; consequently its motion must be much more swift than that of the Moon. A satellite nearer Jupiter would move still more swiftly than this satellite; so that if a satellite revolved about Jupiter at a distance from his centre equal to the distance of the Moon from the Earth, it would move much more swiftly than the Moon moves about the Earth, and therefore would be acted on by a much greater centripetal force; for it requires always a greater force to bend into the same orbit a body that moves with a greater velocity. But the quantities of matter in the central bodies are proportional to their attractive powers at equal distances, and therefore the matter in Jupiter must very much exceed the matter in the Earth. In like manner, we may easily observe that Mercury revolves about the Sun in very little more than thrice the time in which the Moon revolves about the Earth, and yet moves in an orbit about 140 times greater, being so many times farther distant from the centre of his motion; from which it is easy to see, that, if a satellite revolved about the Earth as far distant from it as Mercury is from the Sun, this satellite would move vastly slower than Mercury: whence it follows that the attractive power of the Sun must be vastly superior to that of the Earth, and therefore that the Sun must contain vastly more matter than the Earth. The matter in Saturn is also

found to be greater than that in the Earth. From our author's calculations, founded on these principles, it follows that the quantities of matter in the Sun, Jupiter, Saturn, and the Earth, are to each other as the numbers 1, $\frac{1}{1067}$, $\frac{1}{3021}$, $\frac{1}{169282}$.

The quantities of matter in these bodies being thus determined, and their bulk being known from astronomical observations, it is easy to compute what matter each of them contains in the same bulk, which gives the proportion of their densities. Thus, our author finds the densities of the Sun, Jupiter, Saturn, and the Earth, to be as the numbers 100, 94½, 67, and 400; from which it appears that the Earth is more dense than Jupiter, and Jupiter more dense than Saturn; that is, those planets which are nearer the Sun are found to be more dense, by which they are enabled to bear the greater heat of the Sun. This is the result of our most subtile inquiries into nature; that all things are in the best situations, and disposed by perfect Wisdom. If our Earth was carried down into the orb of Mercury, our ocean would boil, and soon be dissipated into vapour, and the dry land would become uninhabitable. If the Earth was carried to the orb of Saturn, the ocean would freeze at so great a distance from the Sun, and the cold would soon put a period to the lives of plants and animals. A much less variation of the Earth's distance from the Sun than this would depopulate the torrid zone if the Earth came nearer the Sun, and the temperate zones if it was carried from the Sun. A less heat at Jupiter's distance is adapted to the greater rarity of his substance: the consequences might be as fatal in Jupiter, if he was carried into the orb of the Earth, as it would be to us to be carried into the orb of Mercury.

The still greater rarity of Saturn is fitted to his more remote orb; so that though he receives 90 times less light and heat from the Sun than we do, he may, nevertheless, be in the best situation that could possibly be assigned him in the system. The same may

be said of the Herschel; and there the situation of Jupiter, and of all the lower planets, may appear as terrible as that of Mercury does to us. Upon the whole we have reason to conclude, that they are all disposed in such order, and in such situations, from which any considerable variation would produce fatal effects. The hypothesis of Des Cartes led him to place the more dense planets at a greater distance from the Sun; but a philosophy founded on the observation of nature corresponds better with the final causes of things, and proves, on every occasion, the wisdom of the Author.

As astronomers have found no satellites revolving about Mercury, Venus, or Mars, we are deprived of the like opportunities of comparing their attractive powers and proportional quantities of matter. But it is highly probable, from what we have said of the Earth, Jupiter, and Saturn, that the densities of the other planets correspond to their distances from the Sun, and are greater in the nearer planets. Sir Isaac Newton has also computed the proportion of the attractive powers of the Sun, Jupiter, Saturn, and the Earth, at their respective surfaces, and finds them to be in proportion as these numbers, 10000, 948, 529, 435, respectively. From which it appears, that the force of gravity towards these very unequal bodies approaches surprisingly to an equality at their surfaces; so that, though Jupiter be several hundred times greater than the Earth, the force of gravity at his surface is very little more than double what it is at the surface of the Earth; and the force of gravity at the surface of Saturn is but about ⅛ greater than that of terrestrial bodies.

Table of the Sun's Rising and Setting every 10th Day:

Sunday	1st, Sun rises	6 h. 12 m.	Sun sets 5 h. 48 m.
Wednesday	11th,	6 h. 31 m.	5 h. 29 m.
Saturday	21st,	6 h. 51 m.	5 h. 9 m.
Tuesday	31st,	7 h. 9 m.	4 h. 51 m.

Table of Equation of Time for every 5th Day. [See January.]

Sunday	1st, *from* the time on the dial *subtract*	10 m.	7 s.
Friday	6th,	11	38
Wednesday	11th,	13	0
Monday	16th,	14	11
Saturday	21st,	15	8
Thursday	26th,	15	49
Tuesday	31st,	16	11

The Sun enters Scorpio on the 24th, at 58 m. past 6 in the morning. Saturn is stationary on the 9th.

It will be new Moon on the 2d, at 55 m. after 10 in the evening: she enters her first quarter on the 10th, at 44 m. past 4 in the morning, is full at 3 m. past 8 on the 18th, and enters her last quarter at 8 m. past 4 on the 25th.

The Moon will be on the meridian on the

12th, at 16 m. after 8 in the evening.
13th, - 1 - - - 9 - - - - - - - -
14th, - 45 - - - 9 - - - - - - - -
15th, - 28 - - - 10 - - - - - - - -
16th, - 10 - - - 11 - - - - - - - -
17th, - 52 - - - 11 - - - - - - - -

The eclipses of Jupiter's satellites are not visible this month, the planet being too near the Sun.

Mercury's greatest elongation will be on the 20th.

Venus' inferior conjunction will occur on the 13th, at 9 in the morning.

Mars will be in opposition at 4 in the afternoon of the 17th.

Jupiter will be in conjunction at half past 7 in the morning on the 14th.

Saturn will be in the quadrature at half past 7 in the morning of the 30th.

HISTORY OF ASTRONOMY.

[Continued from p. 269.]

In reviewing the labours of Dr. Maskelyne at the Royal Observatory, we may begin with his publication

of the Greenwich Observations, which were printed in 1774, by command of his Majesty. The first volume began with the year 1765, and they have been continued annually ever since. The same learned French astronomer to whom we alluded in the last portion of this History, M. Lalande, in mentioning this performance, calls it 'le recueil le plus precieux que nous ayons.' Since that period (1792) they are universally allowed to possess an unrivalled degree of accuracy. This catalogue of the right ascensions and declinations of thirty-six principal fixed stars, with tables for their corrections, is a most useful and important performance, and is adopted in all observatories. His observations, *also*, of the Sun, Moon, and planets, are equally esteemed, and have been made the basis of the solar and lunar tables, lately computed in France, according to the theory of M. Laplace, and which are republished in the third volume of Professor Vince's Astronomy.

We may farther observe, that the communications of Dr. Maskelyne to the Royal Society are distinguished, like his other production, for great attention to utility as well as accuracy. They consist chiefly of astronomical observations;—improvements of certain mathematical instruments;—computations of the eclipses of the Sun, Moon, and Jupiter's satellites;—articles on parallaxes, light, vision, refraction, weights, measures, gravitation, &c. Nor must it be forgotten, that, in the year 1774, he went to Schehallien, in Perthshire, in order to ascertain the lateral attraction of the hill, by which the mean density of the Earth was calculated, and its central attraction, according to the Newtonian theory, first demonstrated. For this paper, Sir George Copley's medal was awarded to him by the council of the Royal Society.

'In the history of science,' says his biographer, 'few persons can be mentioned who have contributed more essentially to the diffusion of astronomical know-

ledge than Dr. Maskelyne; and, perhaps, no man has been so successful in promoting practical astronomy, both by sea and by land. During his time, private observatories became very general, though scarcely known before; nor could such be made useful without the aid of his Nautical Almanack. Besides the assistance thus derived from his publications, he was always ready to give advice concerning plans that seemed likely to promote the interests of science.'

Having now endeavoured to do some justice to the memory and labours of the dead, whose names will be long preserved in the annals of discovery, we shall take notice of a living astronomer, who has enlarged the boundaries of this science beyond all that have lived before him. Our readers will know that we refer to William Herschel, LL.D. F.R.S., whose superior talents were discovered, brought into action, and properly directed, by his present Majesty King George III.

Dr. Herschel, born in Hanover, November 15, 1738, was the second of four sons, all of whom were brought up to the profession of their father, which was that of a musician. Being himself burdened with a large family, and without adequate means for their support, he was unable to give his children the advantages of a liberal education. Finding however, in his son William, a lively and inquisitive genius beyond what appeared in his other sons, he gave him the advantage of a French master, under whom he made a most rapid progress in the attainment of that language. Under the same tutor he obtained a good knowledge of logic and other branches of science connected with the invigoration of the talents and the improvement of the mind.

In the year 1759, he left his country, having little or nothing to depend upon for his support except a

musical instrument. When he arrived in London, his expectations of finding employment were grievously disappointed, and he resolved to go into the country, hoping that his chance of success, as a professor of music, might be greater where the number of candidates is proportionally small. After travelling many a weary mile, he at length arrived at Halifax, where he was appointed organist. Here he taught music with approbation and profit, but still his love of general knowledge was predominant, and he devoted all his spare hours to the study of the languages, and other literary and scientific pursuits. He began with the Italian language, on account of its intimate connection with his own profession; and from this he proceeded to the Latin, in which he made considerable and rapid progress.

From the languages he went to the most abstruse sciences, and having, it is presumed, laid a good foundation in the elementary parts of mathematics, he began to study Dr. Smith's Harmonics, a work which unquestionably requires much patient attention and a penetrating genius. His situation at Halifax was highly favourable to the cultivation of his talents, and, when he had laid in a stock of sound learning, he emerged from his retirement in the north, and came to Bath in the year 1766, having been previously elected organist to the Octagon chapel of that city.

Here he almost instantly entered upon a vast field of professional business, performing at the rooms, theatre, oratorios, and public and private concerts, besides attending upon a number of pupils. In the midst of all this employment, he found leisure to continue his mathematical studies: he even pursued them with increasing ardour, and, after a day of hard labour, he found recreation and delight in the solution of abstruse questions in geometry and fluxions. In the Ladies' Diary he gave an elegant answer to a very

difficult prize question respecting the vibrations of a musical chord loaded in the middle with a small weight.

It was about this time his studies were chiefly confined to optics and astronomy, to which his attention was, at first, incidentally directed. The pleasure, however, which he felt in a cursory view of the heavens, through a two-feet Gregorian telescope, which he borrowed, made him extremely desirous of possessing a complete set of astronomical instruments.

Dr. Herschel having done so much with telescopes, it may be worth while to give a particular account of his progress in this department of practical science, viz. the manufacture of instruments by means of which he became the most fortunate of all observers in the number and extent of his discoveries in the heavens. His first object was to get a larger telescope; and being ignorant of the price at which such instruments are usually charged, he desired a friend in London to buy one for him. This gentleman, surprised at the sum demanded for the telescope, declined purchasing it till he had informed Mr. Herschel of the circumstance. Our astronomer's astonishment was equal to that of his friend's; but, instead of dropping his pursuit, he formed what many would have regarded as a most romantic resolution, that of making a telescope for himself. He did not content himself with a speculative idea, but, from the scanty instructions he could gather out of optical treatises, actually set about this arduous undertaking. Disappointment succeeded disappointment; but all this only served to act as a stimulus to his ardent mind; and, at length, his perseverance was crowned with such success, that, in 1774, he enjoyed the exquisite satisfaction of beholding the heavens through a five-feet Newtonian reflector of his own workmanship. Our modern Galileo did not rest at this attainment, great as it was, but, with a laudable ambition, set about making instruments of

a greater magnitude than had hitherto been known. After constructing those of seven and even ten feet, he thought of forming one not less than double the latter size. So great was his patience, so determined his perseverance, that, in perfecting the parabolical figure of a seven-feet telescope, he did not make less than two hundred specula before he obtained one that would bear any power that was applied to it.

While he was thus laboriously employed in mathematical pursuits, he did not neglect the immediate duties of his profession. Yet so much did his new occupation engage his mind, that he has frequently stolen from the theatre, or the concert-room, to look at the stars, and then return again *in* time to bear his part among the musical performers. This constancy to Urania was at length most bountifully rewarded by the discovery of a new planet in our system, to which he gave the name of Georgium Sidus, but which foreign astronomers have generally termed Herschel.

[To be continued.]

The Naturalist's Diary.

Farewel, gay Summer! now the changing wind
That Autumn brings commands thee to retreat;
It fades the roses which thy temples bind,
And the green sandals which adorn thy feet.

THE groves now lose their leafy honours; but, before they are entirely tarnished, an adventitious beauty, arising from that gradual decay which loosens the withering leaf, gilds the autumnal landscape with a temporary splendour, superior to the verdure of spring, or the luxuriance of summer. The infinitely various and ever-changing hues of the leaves at this season, melting into every soft gradation of tint and shades, will long continue to engage the imitation of the painter, and the contemplation of the poet and the philosopher.

Those virgin leaves of purest vivid green,
Which charmed ere yet they trembled on the trees,
Now cheer the sober landscape in decay;
The lime first fading; and the golden birch,
With bark of silver hue; the moss-grown oak,
Tenacious of its leaves of russet brown;
Th' ensanguined dogwood, and a thousand tints
Which Flora, dressed in all her pride of bloom,
Could scarcely equal, decorate the groves.

What a beautiful description is this of the appearance which some of the trees, in particular, are observed to exhibit!

From the gradual change and decay of the leaf, we are next invited to contemplate its fall. This last circumstance is so striking, that the whole declining season of the year is often, in common language, called the fall. Here Thomson again presents us with a prospect. What he had before described, the general aspect of the woods, was obvious, perhaps, to every admirer of nature. But what poet had ever before described so minute a circumstance as the effect which the falling leaf often has upon the contemplative mind?

Now the leaf
Incessant rustles through the mournful grove;
Oft startling such as studious walk below,
And slowly circles through the waving air.
But should a quicker breeze, amid the boughs
Sob, o'er the sky the leafy deluge streams;
Till choaked, and matted with the dreary shower,
The forest walks, at every rising gale,
Roll wide the withered waste, and whistle bleak.
Fled is the blasted verdure of the fields;
And, shrunk into their beds, the flowery race
Their sunny robes resign. Ev'n what remained
Of stronger fruits, falls from the naked tree;
And woods, fields, gardens, orchards, all around
The desolated prospect thrills the soul.

Nature having perfected her seeds, her next care is to disperse them: the seed cannot answer its purpose while it remains confined in the capsule. After the seeds, therefore, are ripened, the pericarpium opens

to let them out; and the opening is not like an accidental bursting, but, for the most part, is according to a certain rule in each plant.

The seeds of many plants are furnished with a plume, by which admirable mechanism they are disseminated by the winds far from their parent stem, and look like a shuttlecock, as they fly. Other seeds are disseminated by animals: of these, some attach themselves to the hair or feathers by a gluten, as misleto; others by hooks, as cleavers, burdock, hounds-tongue; and others are swallowed for the sake of the fruit, and voided uninjured, as the hawthorn, juniper, and some grasses: other seeds again are dispersed by means of an elastic seed-vessel, as oats, geranium, and impatiens: and the seeds of aquatic plants, and of those that grow on the banks of rivers, are carried many miles by the currents into which they fall. It is a curious circumstance, and not generally known, that most of those oaks which are called spontaneous, are *planted by the squirrel*[1].

Horse-beans are set by jays and pies, who conceal them among the grass and moss, and afterwards, most probably, forget where they had stowed them. Horse-beans and peas sprang up in Mr. White's field-walks in the autumn, and he attributes the sowing of them to birds. *Bees*, observes the same naturalist, are much the best setters of cucumbers. If they do not happen to take kindly to the frames, the best way is to tempt them by a little honey put on the male and female bloom. When they are once induced to haunt the frames, they set all the fruit, and will hover with impatience round the lights in a morning, till the glassed are opened. Some seeds lie dormant for a long time, and do not vegetate till the sun and air are admitted.

Hips, haws, sloes, and blackberries, now adorn our hedges; and the berries of the barberry (*berberis vul-*

[1] See T. T. for 1814, p. 270.

garis, bryony (*tamus communis*), honeysuckle, elder, holly, woody-nightshade, and privet (*ligustrum vulgare*), afford a valuable supply of foods for many of the feathered race, while passing their winter with us.

About the middle of the month, the common martin disappears; and, shortly afterwards, the smallest kind of swallow, the sand-martin, migrates. The Royston or hooded crow (*corvus cornix*) arrives from Scotland and the northern parts of England, being driven thence by the severity of the season. It destroys lambs, young partridges and moor fowl, and is almost as mischievous as the raven. The woodcock returns, and is found on our eastern coasts. Various kinds of waterfowl make their appearance; and about the middle of the month, wild geese leave the fens, and go to the rye lands, to devour the young corn. Rooks sport and dive in a playful manner, before they go to roost, congregating in large numbers. Stares assemble in the fen countries, in vast multitudes, and, perching on the reeds, render them unfit for thatching, and thus materially injure the property of the farmer.

The ground is covered, about this time, with spiders' webs, crossing the path from shrub to shrub, and floating in the air.

Few flowers are to be seen in this month; the woodbine and some other kinds, however, blow a second time, but they have lost their fine scent[1]. Yet,

[1] The 'Last Rose of Summer,' from 'Irish Melodies,' has so much beauty, that we cannot refuse to transplant it into our poetical parterre.

'Tis the last rose of summer,
Left blooming alone;
All her lovely companions
Are faded and gone;
No flower of her kindred,
No rose-bud is nigh,
To reflect back her blushes,
Or give sigh for sigh!
I'll not leave thee, thou lone one!
To pine on the stem;

the *green-house* is now in perfection, and will amply compensate for the deficiency.

As flowers now decay, and the bees cannot procure any farther support, this is the season for taking the honey. To obtain this precious article, the industrious collectors are destroyed with the fumes of burning brimstone. Various methods have been proposed to save the lives of the bees; but they are found so materially to reduce the profits of the owners, that it will be long before they are generally adopted.

The taking of wild-fowl commences, by act of parliament, on the 1st of October, and the *decoy*-business it at the greatest height *about the* end of the month. Great numbers of wild ducks and other waterfowl are annually caught in the extensive marsh lands of Lincolnshire in this way. Particular spots, or decoys, in the fen countries, are let to the fowlers at a rent of from five to thirty pounds per annum; and Pennant instances a season, in which 31,200 ducks, including teals and wigeons, were sold in London only, from ten of these decoys, near Wainfleet, in Lincolnshire[1].

The weather in October is peculiarly favourable to the sports of the field; and hunting is now at its

Since the lovely are sleeping,
Go sleep thou with them:
Thus kindly I scatter
Thy leaves o'er the bed,
Where thy mates of the garden
Lie scentless and dead.

So soon may *I* follow,
When friendships decay,
And from Love's shining circle
The gems drop away!
When true hearts lie withered,
And fond ones are flown,
Oh! who would inhabit
This bleak world alone?

[1] See the decoys described in T.T. for 1814, p. 275.

height, as little damage is committed on the farmer's grounds after the gathering of the harvest.

The sowing of wheat is, generally, completed in this month: when the weather is too wet for this occupation, the farmer ploughs up the stubble fields for winter-fallows. Acorns are sown at this season, and the planting of forest and fruit-trees takes place.

NOVEMBER.

THE Saxons called November *wint-monat*, or wind-month, on account of the prevalence of high winds in this month.

This month the long vacation's o'er,
And lawyers go to work once more;
With their materials all provided,
That they may have the cause decided.
The plaintiff he brings in his bill,
He'll have the cause, cost what it will;
Till afterwards comes the defendant,
And is resolved to make an end on't.
And having got all things in fitness,
Supplied with money and with witness;
And makes a noble bold defence,
Backed with material evidence.
The proverb is, one cause is good
Until the other's understood.
They thunder out to little purpose,
With certiorari, habeas corpus,
Their replicandos, writs of error,
To fill the people's hearts with terror.
And if the lawyer do approve it,
To chancery they must remove it.
And then the two that were so warm,
Must leave it to another term;
Till they go home and work for more,
To spend as they have done before.

Poor Robin, for November 1759.

Remarkable Days.

1.—ALL SAINTS.

IN the early ages of Christianity the word *saint* was applied to all *believers*, as is evident in the use of it

by Saint Paul and Saint Luke; but the term was afterwards restricted to such as excelled in Christian virtues. In the Romish church, holy persons canonized by the Pope are called *saints*, and are invoked and supplicated by the professors of that religion. The church of England instituted this festival in memory of all good men defunct, proposing them as patterns for Christian imitation, but not allowing any prayers to be addressed to them.—For some rural customs on this day, see T.T. for 1814, pp. 278-9.

2.—ALL SOULS.

In Catholic countries, on the eve and day of All Souls, the churches are hung with black; the tombs are opened; a coffin covered with black, and surrounded with wax lights, is placed in the nave of the church, and, in one corner, figures in wood, representing the souls of the deceased, are halfway plunged into the flames.

5.—KING WILLIAM LANDED.

The glorious revolution of 1688 is commemorated on this day, when the throne of England became vested in the illustrious House of Orange.

Although King William landed on the 5th of November, the almanacks still continue the mistake of marking it as the *fourth*.

5.—POWDER PLOT.

This day is kept to commemorate the diabolical attempt of the Papists to blow up the Parliament House. The best account of this nefarious transaction is detailed in Hume's History of England, vol. vi, pp. 33-38 (8vo edition, 1802.)—See also T.T. for 1814, pp. 280-5.

6.—SAINT LEONARD.

Leonard, or *Lienard*, was a French nobleman of great reputation in the court of Clovis I.; he was instructed in divinity by Remigius, Bishop of Rheims, and afterwards made Bishop of Limosin. Several miraculous stories are told of him by the monks, not worth relating. He died about the year 559, and has

always been implored by prisoners as their guardian saint.

9.—LORD MAYOR'S DAY.

The word *mayor*, if we adopt the etymology of Verstegan, comes from the antient English *maier*, able or potent, of the verb *may* or *can*. King Richard I, A.D. 1189, first changed the bailiffs of London into Mayors; by whose example, others were afterwards appointed. Upon the authority of an old resident in the city of York, we are informed that the title of *Lady* was, till within these few years, retained by the Mayor's wife in that city, *during her life*, but that her husband's title died with his office;—and the following couplet is cited in evidence:

My Lord's a lord for a year and a day,
But my Lady's a lady for ever and aye.

11.—SAINT MARTIN.

He was a native of Hungary, and for some time followed the life of a soldier; but afterwards took orders, and was made bishop of Tours, in France, in which see he continued for twenty-six years. Martin died about the year 397, much lamented, and highly esteemed for his virtues.—For a pleasing little ballad on this day, see T.T. for 1814, p. 286.

13.—SAINT BRITIUS.

Britius, or Brice, succeeded St. Martin in the bishopric of Tours in the year 399. He died in 444.

17.—SAINT HUGH.

Our saint was a native of Burgundy, or Grationopolis. At first he was only a regular canon, but afterwards a Carthusian monk, and at length, through the favour of King Henry II, was constituted Bishop of Lincoln. In this see he obtained great fame, not only for his extraordinary austerity of life and excellent economy, but for his rebuilding the cathedral from the foundation. Hugh died on this day, in the year 1200, of an ague. In 1220, he was canonized

at Rome, and his remains were taken up October 7, 1282, and deposited in a silver shrine.

20.—EDMUND, KING AND MARTYR.

Edmund, king of the East-Angles, having been attacked by the Danes in 870, and unable to resist them, heroically offered to surrender himself a prisoner, provided they would spare his subjects. The Danes, however, having seized him, used their utmost endeavours to induce Edmund to renounce his religion; but refusing to comply, they first beat him with clubs, then scourged him with whips, and afterwards, binding him to a stake, killed him with their arrows. His body was buried in a town, where Sigebert, one of his predecessors, *had built* a church; and where afterwards (in honour of his name) a more spacious building was erected, which together with the town was named St. Edmunds-bury; but it is now called *Bury*.

22.—SAINT CECILIA.

Cecilia was a Roman lady, who, refusing to renounce her religion, was thrown into a furnace of boiling water, and scalded to death. Others say that she was stifled in a bath, a punishment frequently inflicted, at that time, on female criminals of rank. She suffered martyrdom about the year 225. Cecilia is regarded as the patroness of music, and is represented by Raffaelle with a regal in her hand.

23.—SAINT CLEMENT.

Clement I was born at Rome, and was one of the first bishops of that place; this see he held about sixteen years, from the year 64 or 65 to 81. He was remarkable for having written two Epistles, so excellent, and so highly esteemed by the primitive Christians, that the first was for some time considered canonical. Clement was sentenced to work in the quarries, and afterwards, having an anchor fastened about his neck, was drowned in the sea.

23.—O. MART.

Old Martinmas-Day; an antient quarter day.

25.—SAINT CATHERINE.

Our saint was born at Alexandria, and received a liberal education. About the year 305, she was converted to Christianity, which she afterwards professed with the utmost intrepidity, openly reproving the pagans for offering sacrifices to their idols, and upbraiding the Emperor Maxentius, to his face, with the most flagrant acts of tyranny and oppression. She was condemned to suffer death by rolling a wheel over her body stuck round with iron spikes.

27.—ADVENT SUNDAY.

This and the three subsequent Sundays, which precede the grand festival of Christmas, take their name from the Latin *advenire*, to come into; or from the word *adventus*, an approach.

30.—SAINT ANDREW.

Andrew was the son of James, a fisherman at Bethsaida, and younger brother of Peter. He was condemned to be crucified on a cross, of the form of an X; and, that his death might be more lingering, he was fastened with cords.

The Order of the Thistle was instituted by Achaius, King of Scotland, in 787; restored by James V, 1540, revived by King James II, in 1687, and re-established by Queen Anne, in 1703. It consists of the sovereign and twelve brethren or knights, making in the whole thirteen, and four officers. The star is worn on the left side of the coat or cloak, and consists of a *St. Andrew's cross*, of silver embroidery, with rays going out between the points of the cross; on the middle a thistle of gold and green upon a field of green, and round the thistle and field a circle of gold, having on it the following motto, in green letters: NEMO ME IMPUNE LACESSIT (no man provokes me with impunity). The badge or jewel is worn pendant to a green riband over the left shoulder, and tied under the arm. It consists of the image of St. Andrew, with the cross before, enamelled and chased on rays of gold, the cross and feet resting upon a ground

of enamelled green; and on the back enamelled on a green ground, a thistle gold and green, the flower reddish, with the above motto round it. The collar consists of thistles and sprigs of rue interspersed, and from the centre is suspended the image of St. Andrew; the whole of gold, enamelled.

Astronomical Occurrences.

Of the Centre of the Solar System.

Sir Isaac Newton having established the general principle of the gravitation of the particles of matter, and having determined the chief powers that act in the system, viz. those which tend to the Sun, Jupiter, Saturn, and the Earth; and having found that the celestial motions are performed in free spaces, where the resistance is insensible; he prepared the way for proceeding synthetically in his account of the system of the world, and inquiring into the various effects that arise from a power so evidently established. Any general principle ascertained in nature is a great acquisition to philosophy, especially when the variations of this power, with its direction and force, are clearly determined; and the fertility of this principle will appear from the various phenomena resolved by it synthetically, of which we are now to treat. Sir Isaac Newton begins with inquiring into the centre of the system. The Pythagoreans ascribed this place to the centre of the Sun, the followers of Aristotle and Ptolemy to the Earth; but Sir Isaac having found that these gravitate towards each other, and towards all the other bodies in the system, neither of them, nor indeed any body in the system, can be supposed to be void of all motion.

It is the centre of gravity of the whole system that is the only point which can be supposed quiescent in it; the same point about which all the matter of the system would soon be accumulated, if the progres-

sive motions of the bodies in it were destroyed, and their gravity was permitted to bring them together. The mutual actions of bodies on each other never affect the state of this centre; their attracting or repelling each other produces no effect upon it; and it must either be quiescent, or proceed uniformly in a right line. All seem agreed that the centre of the system is at rest, and no reason or observation argues for our ascribing any motion to it. The centre of gravity of the system is, therefore, the only immoveable point, while all the bodies in the system move round it with various motions.

As we have our knowledge of gravity, and the laws of nature, from what passes on the surface of the earth, we cannot illustrate the motions of the bodies of the solar system, arising from their mutual gravity, better than by some images we find of them on the earth, after having shown so fully the similarity of the powers that act on the parts of the earth and on the celestial bodies. We know that when, by any power or machine, a body is projected in the air, the power reacts on the earth with an equal force; and that, if the power was sufficient to project a mountain, or a much larger part of the earth, it would act on the remainder of the earth with an equal force, in an opposite direction; so that, while the projected part begun to move in its curve, the remainder of the earth would begin at the same time to move in an opposite direction, with an equal quantity of motion, but with a velocity so much less as the matter in it is greater than in the projected part; and both would revolve in certain orbits about the common centre of gravity, which would continue in the same state as before the projection. If, by the resistance of the medium, the motions of these parts of the earth came to be destroyed, they would come together again, and be accumulated in one mass about the same centre. If there were more such parts of the earth projected, the centre of gravity of all would be no way affected by

such projections, but they would move round it, so that the sum of the motions on one side of it should be equal to the sum of the motions on the other side: and this obtains even in those small motions that are every day produced by powers and agents on the earth.

The motions of the great bodies in the solar system are analogous to these: the different parts of the solar system gravitate to each other, as the parts of the earth gravitate towards one another; and the different parts of the system move in the same manner about their common centre of gravity, as the parts into which we supposed the earth to be divided, if projected in any direction, would all move about their common centre of gravity; or as the earth, and all the bodies that are actually projected every day on its surface, revolve about the common centre of gravity of the earth and these projectiles. Only there is this difference, that the bodies of the great system were projected at great distances from each other, and in such a manner that the planets revolve in orbits almost circular, so as not to come too near to the Sun, or to be carried too far from him, in their revolutions. The Creator of the World had in vain made them of densities adapted to certain distances, if he had not projected them with the forces that were requisite to preserve them revolving at those distances, or near to them; and as the greatness of the force impressed on those vast bodies, some of which are many times larger than our earth, shows the power, its just quantity, varied regularly in the different distances of the planets, and its proper direction, show the skill of the first Mover.

We may suppose that all the matter of which the system consists was formed first in one mass, where now the centre of gravity of the whole system is found; that of this mass various bodies were formed, and separated from each other to proper distances, where they received their projectile motions; and that the

powers which separated and moved them observed the law of nature, that requires an equality between action and re-action, and is observed in all the actions of powers at present: and thus these motions would begin, and continue for ever, without producing any motion in the centre of gravity of the system.

When the bodies were thus moved in their proper orbits, we may conceive some of them to have been subdivided again, by actions observing the same laws, into several other bodies, which, in like manner, were formed into lesser systems; as that of the Earth and Moon, those of Jupiter and Saturn and their satellites. There is not any of these quiescent in its particular system; the Earth and Moon move about their common centre of gravity, while it is carried with a regular motion round the centre of gravity of the whole system. The same may be said of Jupiter and Saturn and their satellites; and it is certain, from the laws of nature, that the motions in any lesser system about its centre of gravity, and the motion of that centre about the centre of gravity of the whole system, interfere not with each other. A lesser system being thus formed, one of the bodies that compose it might be subdivided into lesser bodies that might form a system of an inferior order. But we do not find that nature carries this subordination so far, unless we should consider the motion of projectiles, near the surfaces of the secondary planets, as an example of this kind.

It is next to be considered, where this point of rest of the common centre of gravity of the system is to be found; and it is plain from what we have already seen, that it can never be far removed from the Sun, because the matter in the Sun vastly exceeds the matter in all the planets taken together; and, from what we said of the centre of gravity above, it appears that it is always nearer the greater body in proportion as it is greater. Jupiter is the largest of the

planets, and yet is but $\frac{1}{1067}$ of the Sun, so that their centre of gravity must be 1067 times nearer the Sun than Jupiter; and as the distance of Jupiter is little more than 1067 semidiameters of the Sun, it follows that the centre of gravity of the Sun and Jupiter cannot be much beyond the surface of the Sun. Saturn is less than Jupiter both in bulk and density, and the centre of gravity of the Sun and Saturn falls within the body of the Sun: and thus it easily appears, that though all the planets were on one side of the Sun in one line, the centre of gravity of the Sun, and them all, could scarcely be above a semidiameter of the Sun from his surface: and this is the farthest that the Sun *is ever removed* from that centre. It appears, therefore, that though the Sun is in perpetual agitation about this centre, yet, being always so near it, he may very well be considered by astronomers as the centre of the solar system. Thus, though the terraqueous globe receives an impression from every power that moves projectiles in the air, and is, to speak accurately, agitated a little by these powers with a very complex motion, yet we consider it as at rest, neglecting such exceedingly minute actions and their effects.

Table of the Sun's Rising and Setting, every 10th Day:

			h. m.		h. m.
Wednesday	1st,	Sun rises	7 14	Sun sets	4 49
Saturday	11th,	- - - - - -	7 29	- - - -	4 31
Tuesday	21st,	- - - - - -	7 44	- - - -	4 16

Table of the Equation of Time, for every 5th Day. [See January.]

			m.	s.
Wednesday	1st, *from* the time on the dial *subtract*		16	13
Monday	6th,	- - - - -	16	11
Saturday	11th,	- - - - -	15	49
Thursday	16th,	- - - - -	15	6
Tuesday	21st,	- - - - -	14	2
Sunday	26th,	- - - - -	12	38

The Sun enters Sagittarius on the 23d, at 20 m. after 8 in the morning.

Mars is stationary on the 17th, and Mercury is stationary on the 21st.

It is new Moon on the 1st, at 34 m. past 9 in the morning. She enters her first quarter on the 8th, at 34 m. past 12 at night; is full at 8 m. past 11 on the 16th; enters the last quarter on the 23d, at 32 m. past 11; and there is another new Moon at 51 m. past 10 at night of the 30th.

The Moon will pass over the meridian on the

10th day	at 42 m. past	7 in the evening.
11th	25	8
12th	6	9
13th	48	9
14th	31	10
15th	17	11
16th	5	12

The first satellite of Jupiter will be eclipsed, visible in London, on the 18th, at 7 m. past 8 in the evening.

Mercury will be in its inferior conjunction on the 12th, at 3 in the morning. The Herschel planet will be in conjunction on the 30th, at ¼ past 5 in the morning.

HISTORY OF ASTRONOMY.

[Continued from p. 294.]

The important discovery, to which we referred in the last section of this History, was made in the night of the 13th of March, 1781. It was by no means a mere accidental circumstance which favoured Dr. Herschel with the view of this planet, but the reward of a regular, patient, and scientific chain of observations. When he first saw it, he was not quite certain that it belonged to our system, but, upon more diligent investigation, he was enabled to ascertain, with exactness, its planetary disk as well as its motion.

There is no doubt that it had been observed by other astronomers, and had been even inserted in their catalogues as a fixed star. But Dr. Herschel, when he first saw it, was struck with its appearance, which seemed to differ from that of the neighbouring small stars. He happened to be accidentally engaged in examining the small stars near the feet of Gemini, and he observed one considerably larger than the rest, but, it not being quite so brilliant, he suspected that it might be a comet; in consequence of which he observed it with different magnifying powers, from 227, with which he discovered it, to 2010, and found that its apparent magnitude increased in proportion, contrary to what takes place in the fixed stars. He therefore measured its distance from some of the neighbouring fixed stars, and, comparing its distance for several nights, he found that it moved at the rate of about $2\frac{1}{4}''$ in an hour. Dr. Herschel wrote immediately to the Royal Society, that other astronomers might join in observing it; upon which it was found and observed by Dr. Maskelyne, who almost immediately declared that he suspected it to be a planet; and, on April 1, he wrote an account of this discovery to the astronomers at Paris, so that it was soon observed by all the astronomers in Europe. Mr. Lexell was then in England, and applied himself to compute the orbit upon the supposition that it was a comet; he, therefore, according to the usual manner in such a case, supposed the orbit to be a parabola, and assumed several perihelion distances, 6, 8, 10, 11, 12, 14, 16, and 18 times the Earth's distance from the Sun, and found that any perihelion distance between 14 and 18 would answer very well to the observations. Boscovich printed a memoir on the subject, in which he showed that there were four different parabolas in which a body might move, and yet the computed places would agree with the observations which had then been made. Other astronomers, however, found that a circular orbit,

whose radius was about 18 times the distance of the Sun from the Earth, would agree better with the observations, and confirmed Dr. Maskelyne's opinion that it was a planet.

This discovery was communicated in the same year to the Royal Society, and, in consequence of it, the author was unanimously elected a member, and had the annual gold medal bestowed upon him for his service to the interests of science. The year following, his Majesty took him under his immediate patronage, and constituted him his own astronomer, with a pension. He now quitted Bath, and his musical instruments, and settled at Slough, near Windsor, at a house appointed for him by the King. Here he was enabled to carry on his projects with vigour, and those which had failed at Bath, were, at Slough, brought to perfection. At the former place he had attempted the bold scheme of constructing a telescope of thirty feet, and actually made several trials to carry his object into effect; but, though he failed there, he more than executed his design at Slough, by finishing one of no less than forty feet, of which we shall hereafter give a full account. In the year 1783, Dr. Herschel discovered a volcanic mountain in the Moon; and, in 1787, he made father observations upon that satellite, and saw, very distinctly, two others which evidently emitted streams of fire from their summits. In the same year, on the 11th of January, he discovered the second and fourth satellites which attend his own planet the Georgium Sidus; and in the following years, previously to 1794, he observed four others revolving round the same body. In 1789, he discovered the sixth and seventh satellites of Saturn, which are, in fact, those which are nearest to the body of that planet. He also determined the rotation and figure of Saturn, discovered that it had a double ring, and was marked with several belts parallel to its equator. His observations on the Sun, Moon, and all the planets, have given us new and

interesting information respecting the phenomena of these bodies. By comparing the proper motions of the fixed stars, Dr. Herschel has discovered that the whole system is advancing towards the constellation Hercules, or to a point in the heavens whose right ascension is 250° 52′ 30″, and whose north polar distance is 40° 22′. The Doctor supposes that this motion is performed round some distant centre, and he has, in vain, endeavoured to determine its velocity; but many ages must elapse before this inquiry can be crowned with success. The theory of the construction of the heavens, advanced by this illustrious astronomer (to which we referred in pp. 291-4 of the former volume), is new and sublime in the highest degree. He supposes the milky way to be an immense nebula, and the solar system to be placed near one of its sides; and he imagines that each nebula, of which he has observed more than 900, consists of a group of suns with their attendant planets. The ingenious micrometers and other optical instruments which he has invented; his important discoveries respecting radiant heat; his researches respecting coloured rays, all of which will be noticed hereafter; united with the extent and sublimity of his astronomical discoveries, entitle him to be considered as one of the greatest benefactors of science.

To proceed with our history: the great distance between the orbits of Mars and Jupiter, contrary to the general harmony of the system, induced the celebrated Lambert, and Professor Bode of Berlin, to predict the existence of a new planet in that part of space. This prediction was accomplished on the 1st of January, 1801, when M. Piazzi, a Sicilian astronomer, discovered a very small planet, about 160 miles in diameter, revolving round the Sun in that region of the heavens. Though the smallness of Ceres, and the nebulosity which surrounded it, induced some astronomers to exclude it from among

the planetary bodies, yet the discovery was supposed to confirm the opinion respecting the harmony of the distances of the planets, and the number of primary planets within the orbit of the Georgium Sidus was supposed to be complete. In the following year, viz. on the 28th of March, 1802, Dr. Olbers, of Bremen, discovered another small planet, to which he gave the name of Pallas, revolving round the Sun nearly at the same distance, and in the same time as Ceres, but remarkable for the eccentricity of its orbit and its inclination to the ecliptic, which far exceed that of all the other bodies in the system. This curious discovery was succeeded by that of another small planet, by Mr. Harding, of Lilienthal, on the 1st of September, 1804. This planet, to which he gave the name of Juno, resembles Pallas in the great eccentricity and inclination of its orbit, and at nearly the same distance from the Sun. The remarkable circumstance of three small planetary bodies being found in the same region of the heavens, with their orbits mutually intersecting one another, induced Dr. Olbers to imagine that they originally formed one planet, and he thought that more of them might be discovered in the same quarter. This opinion put him upon the alert, and he accordingly examined the two regions of the heavens in which the nodes of their orbits are placed; and, on the 26th of March, 1807, he discovered a fourth planet, which he called Vesta, similar to the rest both in its position and magnitude. The writer of a part of the article Astronomy in the Edinburgh Encyclopedia, probably Dr. Brewster himself, says, he has endeavoured to connect, with the phenomena of these smaller planetary bodies, the meteoric stones that have occasionally been found to fall upon the Earth, and which he supposes to be lesser portions of a large planet, of which Ceres, Pallas, Juno, and Vesta, are the greater fragments; and he has attempted to prove, from the inclination and eccen-

tricity of their orbits, from the position of their nodes, and from the place of their aphelia, that these four planets have all diverged from a common centre, and therefore have formerly been combined in one planetary body. See much more on the subject of these four planetary bodies, pp. 239-243, and 259-264, of the first volume of 'Time's Telescope.'

[To be continued.]

The Naturalist's Diary.

The rushing winds more shrilly rave,
And thick descends the yellow leaf
In whirling eddies from on high.

THE trees are now stripped of their foliage. The separation of the leaves from their branches is termed the *fall;* and, in North America, the season in which this takes place is universally known by that name. The falling of leaves is not always in consequence of the injuries of autumnal frosts, for some trees have their appropriate period of defoliation, seemingly independent of external causes. The lime (*tilia europæa*) commonly loses its leaves before any frost happens; the ash seems, on the contrary, to wait for that event; and at whatever period the *first* rather sharp frost takes place, all its leaves fall at once.

Leaves undergo very considerable changes before they fall: ceasing to grow for a long time previous to their decay, they become gradually more rigid and less juicy, often parting with their pubescence, and always changing their healthy green colour to more or less of a yellow, sometimes a reddish hue. 'One of the first trees that becomes naked is the walnut; the mulberry, horse-chesnut, sycamore, lime, and ash, follow. The elm preserves its verdure for some time longer: the beech and ash are the latest deciduous forest trees in dropping their leaves. All lopped trees, while their heads are young, carry their leaves a long while. Apple-trees and peaches remain

green very late, often till the end of November: young beeches never cast their leaves till spring, when the new leaves sprout, and push them off: in the autumn, the beechen leaves turn of a yellow deep chesnut colour.'—(*White.*)

That highly esteemed fish, the *salmon*, now ascends rivers to deposit its spawn in their gravelly beds, at a great distance from their mouths.

The stock-dove (*columba œnas*), one of the latest winter birds of passage, arrives from more northern regions, towards the end of this month.

The wild pigeons, which migrate in large flocks into England at the approach of winter, build their nests in the hollows of decayed trees, and commonly have two broods in the year.

The farmer usually finishes his ploughing this month. Cattle and horses are taken into the farm-yard; sheep are sent to the turnip-field; ant-hills are destroyed; and bees are put under shelter.

Of November, 'chill and drear,' we take leave, in the words of a favourite poetess:—

November, why does every brow
Droop, as thy dun cloud sails the sky?
Why do thy hours o'er mortals flow
Lagging and sullenly?
Seldom, dark Month, thy form is seen
To wear December's warrior mien;
Still does thy scanty verdure grow,
Unburied yet by winter's snow:
The storms, which soon shall burst amain,
With all their winds, a boisterous train,
But menace now—yet who but sighs
For louder winds, and wilder skies?
Who but looks onward with desire
To the clustering group and social fire?
Then get thee hence—tread thou the path
Which circling months have trod before;
Give way to Winter's honest wrath,
For, grateful that *thy* reign is o'er,
Welcome the fleecy shower! welcome the whirlwind's roar[1]!

[1] Holford's Poems, 8vo, 1811, pp. 85, 86.

DECEMBER.

DECEMBER was called *winter-monat* by the Saxons, but after they were converted to Christianity it received the name of *heligh-monat*, or holy month.

'Now comes December, which after January for new-years gifts, February for pancakes and valentines, March for leeks for the Welchmen, April for fools, May for milkmaids and their garlands, June for green pease, mackerel, beans and bacon, and what not (this is a plentiful time), July for hay in the country, and August for corn, September for oysters, October for brewing good beer, and November *for drinking it*. After all these are past, some for working, but all for eating and drinking, after all comes December, with the barns full of corn, the larders full of beef and pork, the barrels full of beer, the oven full of Christmas pies, the pocket stored with money, the masters and mistresses full of charity, and the young men and maids full of play.'—(*Poor Robin, for December* 1757.)

Remarkable Days.

6.—SAINT NICHOLAS.

NICHOLAS was bishop of Myra, in Lycia, and died about the year 392. He was of so charitable a disposition, that he portioned three young women, who were reduced in circumstances, by secretly conveying a sum of money into their father's house. Milner, in his History of Winchester, describes a curious font preserved in the cathedral of Winchester, and applies the carvings on it to the life and miracles of this saint. The annual ceremony of the *boy-bishop*, once observed on this day, is described at length in T.T. for 1814, p. 306-308.

8.—CONCEPTION OF THE VIRGIN MARY.

This festival was instituted by Anselm, Archbishop of Canterbury, because William the Conqueror's fleet, being in a storm, afterwards came safe to shore. The council of Oxford, however, held in 1222, permitted every one to use his discretion in keeping it.

December 10th is a fast observed by the *Jews*, on account of the approaches then made by the Romans to besiege Jerusalem; the commencement of the national calamities of the Jews.

December the 12th is, by devout *Jews*, observed as a fast, on account of the profanation of the Holy Writings by their translation into Greek; a calamity said to have been succeeded by three days' darkness.

13.—SAINT LUCY.

This virgin martyr was born at Syracuse. She refused to marry a young man who paid his addresses to her, because she had determined to devote herself to religion, and, to prevent his importunities, gave her whole fortune to the poor. The youth, enraged at this denial, accused her before Paschasius, the heathen judge, of professing Christianity; and Lucy, after much cruel treatment, fell a martyr to his revenge, in the year 305.

16.—O SAPIENTIA.

This is the beginning of an Anthem in the Latin service to the honour of Christ's advent, which used to be sung in the church from this day until Christmas Eve.

21.—SAINT THOMAS THE APOSTLE.

Thomas, surnamed *Didymus*, or the Twin, was a Jew, and in all probability a *Galilean*. There are but few passages in the gospel concerning him. Thomas is said to have suffered martyrdom in the same city, being killed by the lances of some people instigated by the Bramins.

This is the shortest day, and is, at London, 7 h. 44 m. 17 s.; allowing 9 m. 5 s. for refraction.

25.—CHRISTMAS DAY.

The feast of our Saviour's nativity was undoubtedly celebrated in the early ages of Christianity; for we are told that, under the persecution of Maximinus, that emperor burnt a church at Nicomedia, which was filled with Christians assembled to keep this festival. St. Gregory terms it the *festival of festivals;* and St. Chrysostom, the *chief of all festivals.* It is named *Christmas-Day* from the Latin *Christi Missa,* the Mass of Christ, and thence the Roman Catholic Liturgy is termed their *Missal* or *Mass-Book.* About the year 500, the observation of this day became general in the Catholic church.

In the primitive church, Christmas-day was always preceded by an Eve or vigil. When the devotion of the Eve was completed, our forefathers used to light up candles of an uncommon size, which were called Christmas candles, and to lay a log of wood upon the fire called the *yule-clog* or log.

For many other customs formerly observed in England at this season, see T.T. for 1814, pp. 309-315.

Of all the various ceremonies observed on Christmas Day, or during this season, those formerly practised in Catholic countries are, perhaps, fraught with the greatest absurdity, more particularly on the continent of Europe. The *Fete de l'Ane,* and the *Fete de Fous,* the Feast of the Ass and of Fools, with other religious farces, are considered by Mr. WARTON[1] to have been first instituted at Constantinople about the year 900, by Theophylact, to wean the

[1] History of English Poetry, vol. ii, p. 369, 370.

minds of the people from pagan ceremonies, by the substitution of Christian spectacles, partaking of the same spirit of licentiousness.

The Ass's FESTIVAL was held in France for many centuries. A curious account of this religious ceremony was published in the year 1807, by M. Millin, a member of the French Institute. It is taken from a manuscript missal belonging to the Cathedral of Sens, and details the impious and extravagant mummeries practised in that church on *Christmas-day*. Pierre Corbeil, the author, was Archbishop of Sens, and died in the year one thousand two hundred and twenty-two.

On this festival of folly, a bishop, or even a pope, was elected for the occasion: the priests were besmeared with lees of wine, and they were masked or disguised in the most extravagant and ridiculous manner. On the eve of the day appointed to celebrate this festival, before the beginning of vespers, the clergy went in procession to the door of the cathedral, where were two choristers singing. Two canons were now deputed to fetch the Ass, and to conduct him to the table, which was the place where the Great Chanter sat, to read the order of the ceremonies, and the names of those who were to take any part in them. The modest animal was clad with precious priestly ornaments, and, in this array, was solemnly conducted to the middle of the choir, during which procession a hymn was sung in a major key, the first stanza of which is as follows:

Orientis partibus
Adventavit asinus
Pulcher et fortissimus
Sarcinis aptissimus.
Hez! Sire Ane, hez!

After this, the office began by an anthem in the same style, sung purposely in the most discordant manner possible; the office itself lasted the whole of

the night, and part of the next day; it was a rhapsody of whatever was sung in the course of the year, at the appropriated festivals, forming altogether the strangest and most ridiculous medley that can be conceived. As it was natural to suppose that the choristers and the congregation should feel thirst in so long a performance, wine was distributed in no sparing manner. The signal for that part of the ceremony was, an anthem commencing, *Conductus ad poculum*, &c. (Brought to the cup, &c.)

The first evening, after vespers, the Grand Chanter of Sens headed the jolly band in the streets, preceded by an enormous lantern. A vast theatre was prepared for their reception before the church, where they performed not the most decent interludes: the singing and dancing were concluded by throwing a pail of water on the head of the Grand Chanter. They then returned to church to begin the morning office; and, on that occasion, several received on their naked bodies a number of pails of water. At the respective divisions of the service, great care was taken to supply the Ass with drink and provender. In the middle of it, a signal was given by an anthem, *Conductus ad ludos* (Brought to play, &c.), and the Ass was conducted into the nave of the church, where the people mixed with the clergy, danced round him, and strove to imitate his braying. When the dancing was over, the Ass was brought back again into the choir, where the clergy terminated the festival.

The vespers of the second day concluded with an invitation to dinner, in the form of an anthem, like the rest, *Conductus ad prandium* (Brought to dinner), and the festival ended by a repetition of similar theatricals to those which had taken place the day before.

What is the most extraordinary fact of all, and indeed barely within the limits of credibility, is, that this most shameful festival was not suppressed till towards the end of the sixteenth century! Some of

its most shocking absurdities had, indeed, been removed, yet the custom was continued[1].

26.—SAINT STEPHEN.

Stephen was the first deacon chosen by the apostles. He was cited before the Sanhedrin, or Jewish Council, for prophesying the fall of the Jewish Temple and economy; and while vindicating his doctrine by several passages of the Old Testament, he was violently carried out of the city, and stoned to death, in the year 33. See *Acts* vii, for his admirable defence.

27.—JOHN EVANGELIST. *See p.* 164.

This day is the *Jewish* Festival of *Lighting the Lamps*, or the dedication of the Second Temple by the Maccabees [see chap. x of book ii], after its profanation by Antiochus Epiphanes, and when the holy vessels were again set apart for its service. During this festival, the Jews return thanks for the victories obtained by their ancestors over the Greeks that invaded the Holy Land. At this time, in remembrance of a miracle said to have been wrought by the seal of the High Priest upon the only flask of oil which remained unpolluted, they light up lamps eight evenings alternately, beginning with one lamp the first evening, and increasing one every time in succession, till there are eight. As, before the High Priest had sealed this flask, it only contained oil sufficient for one day, but which was made by a miracle to last eight, the same period is observed in its celebration.

28.—INNOCENTS.

The slaughter of the Jewish children, by Herod, is commemorated on this day. The festival is very an-

[1] Strange as it may appear, this asinine festival was annually celebrated in ENGLAND, in the *Cathedral of Lincoln*, till the *Eleventh* Century; when Grosthead, the bishop, ordered his deans to abolish the FESTUM ASINORUM, *cum sit vanitate plenum et voluptatibus spurcum*. See also CORPUS CHRISTI, at p. 172.

tient, for Tertullian and Saint Cyrian call these Innocents martyrs, and Prudentius has written a hymn upon the subject. *Childermas* day is another name for this feast.—This day is observed by the *Jews* on account of Jehoiakim's burning the scroll that the Prophet Baruch wrote from the mouth of Jeremiah.

31.—SAINT SILVESTER.

He was Bishop of Rome; and succeeded Miltiades in the papacy, in 314. Silvester is accounted the author of several rites and ceremonies of the Romish church, as asylums, unctions, palls, corporals, mitres, &c. He died in 334.

Astronomical Occurrences.

Of Gravity, and of the Irregularities that it produces in the Motions of the Planets.

If the planets were acted on by a power directed to the centre of the Sun only, varying according to the general law of gravity, and that centre was quiescent, their motion about it would be perfectly regular. But we have found that each of the planets was acted on by a power directed to every body in the system. In order to judge of the effects of these actions, Sir I. Newton first supposes two bodies equally gravitating towards each other, and revolving about their common centre of gravity: and, since the direction of their mutual gravitation passes always from the one to the other through their centre of gravity, and their distances from it vary always in the same proportion as their distances from each other, it follows, that they must describe equal areas in equal times about that centre, and about each other, and describe similar figures about that point and about each other. So that, in the motions of two bodies, no irregularities arise in their motions about each other from their mutual attractions, whatever the law of their gravity be supposed to be; only they will finish their revolutions about the centre of gravity in

less time than if the one was to revolve about the other quiescent, at the same distance, and with the same centripetal force; because the orbit described about the centre of gravity being less than that which is described by any one of them about the other quiescent (their distance from each other being equal in both cases), and being also similar to it, it must be described in less time.

If three or more bodies mutually attract each other, the gravitation of any one, arising from the actions of the rest, may be determined by the rule for the composition of motion; and if the law of gravity be such as we find to obtain in the solar system, its gravitation will not be always directed to the centre of gravity of the other bodies, or indeed to any fixed point, but sometimes to one side of that centre and sometimes to the other, and therefore equal areas will not be described in equal times about any point in the system, and several irregularities will necessarily arise in the motions of the bodies. But if we suppose one of these bodies to be vastly greater than the rest, so that the actions of the other bodies may be neglected, if compared with its action, and the centre of gravity of the system be always found near it, then the irregularities in the motions, in such a system, will be very small. The areas described in equal times, about the centre of that great body, will be nearly equal, and the orbits described will be nearly elliptic, having that centre in their focus. That this is the case of the Sun and planets, appears from what we have shown concerning their quantities of matter; and thus we see, that not only the regular motions of the planets are to be derived from the principle of gravity, but also how their minute errors and irregularities are accounted for from it. The same is the case of Jupiter and Saturn, and their satellites. As for the Earth and the Moon, though there be a less disproportion in their magnitudes, and their common centre of gravity be sensibly removed from

the Earth, yet, as there are only two in their system, no irregularities arise from their mutual actions in their motions about their common centre of gravity, or they are easily determined when the position of their centre of gravity is known. These lesser systems of the Earth, Jupiter, and Saturn, are carried about the centre of gravity of the general solar system, without receiving any disturbance from any action of the Sun or planets, which is equal on all their parts, and in the same direction. When a fleet of ships is carried away by a current that affects them equally, it has no effect on their particular motions among themselves, nor is the motion proceeding from the current discovered by them, if they have no body in sight that is not affected by it. In the same manner, if the gravity towards the Sun acted equally, and in the same direction, on the parts of these lesser systems, it would have no effect on their motions among one another, and could only be discovered by comparing their motions with the fixed stars, or with some body foreign to that lesser system, which is acted on in a different manner by the Sun. But as there is some variation in the actions of the Sun upon the parts of these systems, and in the directions of these actions, from hence some irregularities necessarily arise.

Though the actions of the Sun and of the inferior planets, compounded together, do not always produce in a superior planet a gravitation exactly directed towards their centre of gravity; yet as, upon the whole, it is more nearly directed to that point than to any other, the motions of a superior planet will be found more regular, by supposing that point to be the centre of its attraction, rather than any other, and its ellipse will be just by placing its lower focus there. A planet that is higher than this will, by its attraction, have some effect on the motion in this ellipse A, but as it also acts on the inferior planets at the same time, no irregularity will arise from that part of its

action which is equal and in the same direction on them all, but from the differences of its actions only; which being exceedingly minute, and having contrary effects in the opposite situations of that higher planet, can produce effects scarcely sensible in many revolutions.

The action of Jupiter on Saturn when greatest (that is in their conjunction when their distance is least) is found to be $\frac{1}{3\,0\,4}$th of the action of the Sun upon Saturn, by comparing the matter of Jupiter with the matter in the Sun, and the square of the distance of the Sun from Saturn with the square of the distance of Jupiter from Saturn. The effect of this action on Saturn is not altogether insensible. But the elliptic orb of Saturn will be found to be more just, if we suppose its focus not to be in the centre of the Sun, but in the centre of gravity of the Sun and Jupiter, or rather in the centre of gravity of the Sun and of all the planets below Saturn. In the same manner, the elliptic orb of any other planet will be found more accurate by supposing its focus to be in the centre of gravity of the Sun and all the planets that are below it.

The whole action of Jupiter disturbs the motion of Saturn in their conjunction, because Jupiter acts upon Saturn and upon the Sun with opposite directions at that time. But, because Saturn acts then in the same direction on Jupiter and on the Sun, if it acted also with the same force on both it would have no effect on the motion of Jupiter about the Sun; and it is by the excess of its action on Jupiter above its action on the Sun that it disturbs the motion of Jupiter. This excess is found to be $\frac{1}{1\,0\,7\,7}$ of the action of the Sun on Jupiter, and therefore is much less than the force with which Jupiter disturbs the motion of Saturn. The actions of the other planets on each other are incomparably less than these, and the irregularities proceeding from those actions are always less in any planet as it is nearer the Sun; only

the orbit of the Earth may appear a little more irregular than that of its neighbouring planets, because it revolves about the centre of gravity of the Earth and Moon, while that centre annually revolves about the Sun.

If the planets were attracted by the Sun and by one another, but the Sun was not reciprocally attracted by them, the centre of gravity of the system, because of the deficiency of this re-action, would necessarily be in motion; and this would be a new source of errors and irregularities. If the primary planets were not attracted by their satellites, as well as the satellites by their primary planets, other irregularities would necessarily arise. If the great planets, Jupiter and Saturn, had moved in the lower spheres, their influences would have had much more effect to disturb the planetary motions. But while they revolve at so great distances from the rest, they act almost equally on the Sun and on the inferior planets, and have the less effect on their motions about the Sun, and the motions of their satellites are, at the same time, less disturbed by the action of the Sun. The Earth and Moon move in a lower sphere, but their motions are the less irregular because there are only two in their system. We shall afterwards see that the comets continue for a very small time among the planetary spheres, and that in the far greater part of their revolutions they are carried to such vast distances that their actions can have very little effect on the motions of the planets. Such is the law of gravity, and the manner of its operation, and such is the disposition of the bodies in the system, as seems well adapted for preserving their motions with great regularity.

Table of the Sun's Rising and Setting every 10th Day:

Friday	1st,	Sun rises 7 h.	56 m.	Sun sets 4 h.	4 m.
Monday	11th,	8	5	3	55
Thursday	21st,	8	8	3	52
Sunday	31st,	8	5	3	55

The 21st is called the shortest day; there are, however, six other days equally short.

Table of the Equation of Time, for every 5th Day. [See January.]

			m.	s.
Friday	1st,	*from* the time on the dial *subtract*	10	54
Wednesday	6th,	- - - - - - - - - - - - - -	8	54
Monday	11th,	- - - - - - - - - - - - -	6	41
Saturday	16th,	- - - - - - - - - - - - -	4	19
Thursday	21st,	- - - - - - - - - - - - -	1	51
Tuesday	26th,	- - - - - - - - - - - - - *add*	0	38
Sunday	31st,	- - - - - - - - - - - - -	3	6

The Sun enters the sign Capricorn 46 m. after 3 in the afternoon of the 22d.

The Moon is eclipsed on the 16th, but invisible here. The Sun is eclipsed on the 30th, but also invisible here.

The Moon enters her first quarter at 50 m. past 9 on the 8th. The Full Moon is on the 16th, at 58 m. after 12 at noon; she enters her third quarter on the 23d, at 9 m. past 7 in the morning; and there will be a New Moon on the 30th, at 51 m. after 2.

The Moon will be on the meridian on the

9th,	at	52	m.	past	6 in the evening.
10th	- -	33	-	- -	7
11th	- -	14	-	- -	8
12th	- -	57	-	- -	8
13th	- -	44	-	- -	9
14th	- -	34	-	- -	10

There will be an eclipse of the first satellite of Jupiter on the 18th; the immersion takes place at 17 m. past 6 o'clock in the morning.

HISTORY OF ASTRONOMY.

[Concluded from p. 314.]

There are, perhaps, no individuals to whom modern practical astronomy owes more than to our scientific instrument makers. They not only afford assistance to others, but have themselves enlarged the boundaries of that knowledge which it is the object of their in-

struments to display. Among these, two are particularly deserving of notice, whose names will immediately occur to many of our readers. With the merits of a Ramsden and Troughton we shall conclude our History of Astronomy. Jesse Ramsden, celebrated through the whole of Europe for his mathematical and astronomical instruments, was the son of an innkeeper, at or near Halifax in Yorkshire, and born in the year 1735. He received the early part of his education at the free-school of Halifax, where he was instructed in the rudiments of classical learning; from Halifax he went, under the patronage of an uncle, to Craven, where he was sent to the school of a clergyman, who had acquired a high reputation by his success in teaching the mathematics. Under this gentleman young Ramsden became a proficient in geometry and algebra, and was making a rapid progress in studies for which his genius seemed peculiarly adapted, when his father sent for him home, and put him apprentice to a clothier at Halifax. At the age of twenty he went to London, where he became clerk in a wholesale cloth warehouse. This situation he retained two or three years, when his inclination for the sciences revived; and, as he possessed at the same time a strong mechanical turn, he resolved to qualify himself for some business which might prove suitable to the bent of his mind. He accordingly bound himself an apprentice to Mr. Burton, of Denmark Court, in the Strand, who was one of the best workmen of his time in making thermometers and barometers, and in engraving and dividing mathematical instruments. Soon after the expiration of his apprenticeship, Mr. Ramsden opened a workshop on his own account, where he soon recommended himself to the employment of all the best and most eminent mathematical instrument makers, particularly Sisson, Dollond, Nairne, and Adams. In the course of that employment, his repeated examination of the instruments which were sent to him for the

purpose of being engraved or divided, led him to notice their defects, and his genius suggested to him the means of removing them, or of constructing better instruments. Having resolved to attempt that task, he soon made himself master of the file and lathe, and even of the art of grinding glasses. By his marriage with Miss Dollond he became possessed of a part of Mr. Dollond's patent for the manufacture of achromatic telescopes.

Before the time of Mr. Ramsden, the methods for dividing mathematical instruments were extremely inaccurate. Graham and Bird made use of beam-compasses, and the latter kept his method a secret till it was purchased from him by the Board of Longitude, in order to be published. Mr. Ramsden had, however, already discovered a method of his own, which, in accuracy, exceeded that of Bird. Having spent ten years in bringing to perfection this machine, the Board of Longitude gave him a premium of a thousand pounds for the invention, and caused a description of it, with a plate, to be published in 1777. Mr. Ramsden also constructed an instrument for dividing straight lines, and, while thus employed on his dividing machine, he made very essential improvements in other instruments. The theodolite, before his time, consisted merely of a telescope, turning on a circle, divided at every three minutes by means of a vernier; but in the hands of Mr. Ramsden it became a new and perfect instrument, which serves for measuring heights and distances, as well as for taking angles. The longest and most perfect theodolite ever constructed was manufactured by him for General Roy, for the purpose of measuring the series of triangles in England which were made to join those of France. It is only of 18 inches in diameter, but its accuracy is so precise as not to admit of an error of a single second. Mr. Ramsden greatly improved the barometer for measuring the heights of mountains, and he simplified the apparatus for the convey-

ance and support of his barometer. His manometers for ascertaining inaccessible distances, without the aid of a base; his assaying balances, which turn with the ten-thousandth part of the thing weighed; his pyrometer, for measuring the dilatation of bodies, and several other instruments that he invented or improved, were evidences of his great talents and indefatigable industry. But the sciences of optics and astronomy are peculiarly indebted to him. By a micrometer of his invention, the diameters of the planets may be measured in every direction, and it may be adapted to all kinds of achromatic telescopes: it may be brought nearer to or removed from the object-glass with ease, so as to render vision distinct; and it may be taken away from the tube of the eye-glasses, so that the telescope may be used without a micrometer.

The equatorial, the transit instrument, and the quadrant, were all greatly improved in the hands of Mr. Ramsden. The meridian telescopes, which he made for Blenheim, Manheim, Dublin, Paris, and Gotha, are highly celebrated for the excellence of their object-glasses. With that of Dublin, stars of the fourth magnitude have been observed in the open day, and those of the third when very near their conjunction with the Sun. Professor Piazzi, well known in the scientific world, had one of Ramsden's five feet telescopes for the Observatory of Palermo.

The mural quadrant is, of all astronomical instruments, the most important; and in this Mr. Ramsden distinguished himself by the exactness of his divisions, and by the general manner of his fitting up the instrument. But our limits do not admit of our recounting half the merits which Mr. Ramsden actually displayed in practice, and in almost every branch of his profession, which, when in the hands of intelligent and scientific men, is of the highest importance to the extension of the boundaries of knowledge. Mr. Ramsden died in the year 1800: he

had, wholly on account of his merits, been admitted a member of the Royal Society, and of the Imperial Academy of Sciences at Petersburgh; and in 1795 he obtained the honour of the Gold Medal, adjudged by the Royal Society to persons distinguished for their excellence in the sciences.

Of Mr. Troughton, by whom practical astronomy has been greatly advanced, and who, we trust, will live long to extend the boundaries of the science, we shall say but little, lest our praises should be imputed to unworthy motives; but as matters of fact, well known to astronomers throughout the civilized world, it may be observed that the great improvements which he has made upon almost all kinds of instruments, and the extreme accuracy with which he divides them, have rendered his name celebrated in every part of Europe, and have inspired the practical astronomer with full confidence in his observations. There is scarcely an observatory in this country, or on the continent, that does not contain some of Mr. Troughton's instruments; and there are few series of observations now made in which they are not used.

Thus have we, in the various parts of our volume, given a brief, but, we trust, faithful, view of the rise and progress of the most sublime, and, perhaps, most perfect, of the sciences. 'Originating,' says a good writer, 'in the necessities, or in the superstitious fears of mortals, astronomy was successfully cultivated in Asia during the very early ages of society. In consequence of some great convulsion in the physical world, the records of wisdom seem to have been destroyed, and the human species itself swept from the face of the earth. The age of darkness, which followed this fatal revolution in human affairs, was illuminated by the wrecks of astronomical science that were strewed over the kingdoms of the East, and that had been preserved on monuments of stone, or in the memories of those who survived the general

desolation. These precious fragments of knowledge were eagerly collected, and led to the cultivation of astronomy in China, Chaldea, and Egypt. From these favoured kingdoms the science passed into Greece, where it received many brilliant accessions from the genius of that refined people. The Grecian astronomers were afterwards allured to Alexandria by the liberality of the Ptolemies, and under their patronage the study of the sciences was cultivated with unusual success. The conquest of Alexandria by the Arabian caliphs transferred to Bagdad the sciences of that illustrious metropolis, and astronomy flourished under the protection of the Saracen princes, when the fairest portions of Europe were shrouded in darkness. The sciences, along with the arms of the Arabs, were carried into Spain, from whence they began to radiate over the rest of Europe. An ardour for celestial observations was now universally displayed. The science advanced with uncommon rapidity, and Copernicus, Tycho, and Kepler, successively arose to confirm and extend its conquests. But after every obstacle was overthrown, and after the invention of the telescope had removed the barrier which nature herself seemed to interpose, astronomy had to contend with new enemies, with the passions and prejudices of a base superstition. Religion was called down from heaven to sanctify the war of persecution which was waged against science, but she shrunk from the degrading alliance, and truth finally triumphed over error. The issue of this disgraceful conflict was, in every respect, glorious to the human mind, and auspicious of its future greatness. By a series of splendid discoveries, which have never been equalled in any department of knowledge, astronomy has advanced with accelerated steps, and has reached that commanding station among the sciences which its sublimity and perfection entitle it to hold.'—See Edinburgh Encyclopedia, art. Astronomy.

The Naturalist's Diary.

Now icicles hang by the wall,
And Dick the shepherd blows his nail,
And Tom bears logs into the hall,
And milk comes home in frozen pail.

THE weather, in December, is cold, bleak, and gloomy; and, generally, one continued succession of storms and tempests. Rain and wind are extremely prevalent, and, as the frost seldom sets in till the latter end of December, this month may be reckoned the most unpleasant of the whole year. At other times, however, November is better entitled to this appellation, and ice and snow, with their companions enumerated in our motto, contribute to give to Christmas that union of frost and good cheer which form the usual character of this season.

From the fall of the leaf, and withering of the herb, an unvarying death-like torpor oppresses almost the whole vegetable creation, and a considerable part of the animal, during this entire portion of the year. The whole race of insects, which filled every part of the summer landscape with life and motion, are now either buried in profound sleep, or actually no longer exist, except in the unformed rudiments of a future progeny. Many of the birds and quadrupeds are retired to concealments, from which not even the calls of hunger can force them; and the rest, intent only on the preservation of a joyless life, have ceased to exert those powers of pleasing, which, at other seasons, so much contribute to their mutual happiness, as well as to the amusement of their human sovereign. Their social connections, however, are improved by their wants. In order the better to secure their scanty subsistence, and resist the inclemencies of the sky, they are taught by instinct to assemble in flocks; and this provision has the secondary effect of gratifying

the spectator with something of novelty and action, even in the dreariness of a wintery prospect.

There is little to contemplate in the vegetable world during this month. The common holly (*ilex aquifolium*), with its scarlet berries, is most conspicuous.

When all the summer trees are seen
So bright and green,
The holly leaves their fadeless hues display
Less bright than they;
But when the bare and wintry woods we see,
What then so cheerful as the Holly Tree?

SOUTHEY.

Those dwarfs of the vegetable *kingdom*, *mosses*, and the liverwort (*lichen*), now attract our notice.

Mosses are almost constantly green, and have the finest verdure in autumn. Some of the mosses spread in a continued leaf; others grow hollow above, like small cups; others round on the top, like mushrooms; and some shoot out in branches. All these have their different seeds, which do not require great delicacy of soil, but take root on any thing where they can grow unmolested. Those *mosses* which rise immediately from the earth are more perfect; some of them white and hollow, or fistulous; and some of them not much inferior to regular plants. The more perfect sorts grow on stones, in the form of a fine pile or fur, like velvet, and of a glossy colour, between green and black. But the first sort, which appears like scurf or crust, seems to rise but one degree above the unwrought mould or earth. An unhealthy tree is never without these imperfect *superplants*; and the more unhealthy the tree is, the better they thrive.

A few of the most remarkable mosses are, the greater water-moss (*fontinalis antipyretica*); bryum rurale; grey bog-moss (*sphagnum palustre*); yellow powderwort (*byssus candelaris*, or *lichen flavus* of Withering); and the common club moss (*lycopodium clavatum*).

Of the liverworts, or lichens, there are more than three hundred and sixty species, the greater number of which are natives of Britain. The various kinds of lichens are subservient to many important purposes; some are used as dying-drugs: in Lapland, one species constitutes the sole winter subsistence of that useful animal the reindeer; and, in Britain, the lichen islandicus, which grows much on the mountains of Wales and Scotland, is used as a medicine.

The shortest day, or winter solstice, happens on the 21st of December.

In this month, those wild animals which pass the winter in a state of torpidity, retire to their hiding places. The frog, lizard, badger, and hedgehog, which burrow under the earth, belong to this class; as also the bat, which is found in caverns, barns, &c. suspended by the claws of its hind feet, and closely enveloped in the membranes of the fore feet. Dormice, squirrels, water-rats, and field-mice, provide a large stock of food for the winter season.

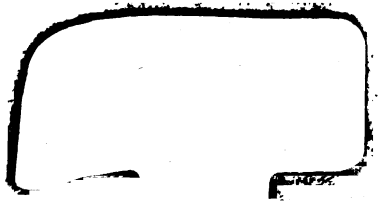
We cannot close our annual series of this Diary, without some reflections which seem to flow naturally from a review of the four seasons.

The annual space in which the Earth performs its revolution round the Sun, is so strongly marked by Nature for a perfect period, that all mankind have agreed in forming their computations of time upon it. In all the temperate climates of the globe, the four seasons are so many progressive stages in this circuit, which, like the acts in a well-constructed drama, gradually disclose, ripen, and bring to an end, the various business transacted on the great theatre of Nature.

The striking analogy which this period, with its several divisions, bears to the course of human existence, has been remarked and pursued by writers

in every age and country. SPRING has been represented as the youth of the year, the season of pleasing hope, lively energy, and rapid increase. SUMMER have been resembled to perfect manhood, the season of steady warmth, confirmed strength, and unremitting vigour. AUTUMN, while it bestows the rich products of full maturity, is yet ever hastening to decline, and has, therefore, been aptly compared to that period, when the man, mellowed by age, yields the most valuable fruits of wisdom and experience, but daily exhibits increasing symptoms of decay. The cold, cheerless, and sluggish WINTER, has, almost without a metaphor, been termed the decrepit and hoary old age of the year. And THOMSON, whose noble poem is not merely a descriptive and, generally speaking, philosophical, but an eminently moral and religious one, has, from this view of his subject, deduced the most instructive lesson:

Behold, fond MAN!
See here thy *pictured life*; pass some few years,
Thy flowering SPRING, thy SUMMER'S ardent strength,
Thy sober AUTUMN fading into age,
And pale concluding WINTER comes at last,
And shuts the scene. Ah! whither now are fled
Those dreams of greatness, those unsolid hopes
Of happiness, those longings after fame,
Those restless cares, those bustling days,
Those gay-spent festive nights, those veering thoughts,
Lost between good and ill, that shared thy life?
All now are vanished! VIRTUE sole survives,
Immortal, never-failing friend of man,
His guide to HAPPINESS on high.

THE END.

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